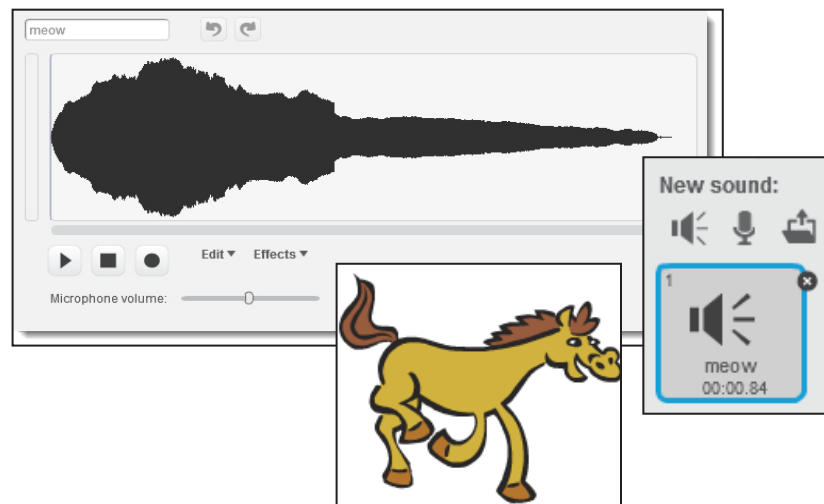


Chapter 5



Noisy Scratchy

- After completing this chapter you will be able to know how to use the Sound Blocks and :
 - get acquainted with the sound library;
 - create your own sound in Scratch by recording;
 - use the play sound block then change the volume;
 - create scripts to play the rythm of Waltz; and
 - use the play note block to create the nursery rhyme.

The Noisy Cat

In the last chapter, you learned how to add speech bubbles for your sprite, but the cat was still silent. That's about to change. In this chapter, you'll learn about the blocks in the **Sound** category, which enable you to add sound to your Scratch scripts. Combining the blocks in this category, you can add sound effects to your projects. You can create a song by playing different musical instruments and playing specific music notes. You can even record custom sounds to add dialog that helps tell a story in your Scratch project.

This chapter starts with an explanation of how to add sound to a Scratch project. You can upload a sound, add a sound from the Scratch library, or record a sound. Once sound is added to your project, you'll want to play it. For that, you need the **Sound** blocks. After a tour of the Sound category's blocks, we'll go through some script examples that show these Sound blocks in action.

Choosing and Recording Sounds

Scratch enables you to add sounds to your project in three ways. You can select a sound from the Scratch library, you can record your own sound, or you can upload a sound file. To do any of these, you first need to click the **Sounds** tab (see Figure 5-1). By default, the **meow** sound is selected from the library (see Figure 5-2). At the bottom of the sound thumbnail, you see how long the sound lasts. In the case of the **meow** sound file, it lasts 00:00:84 seconds.

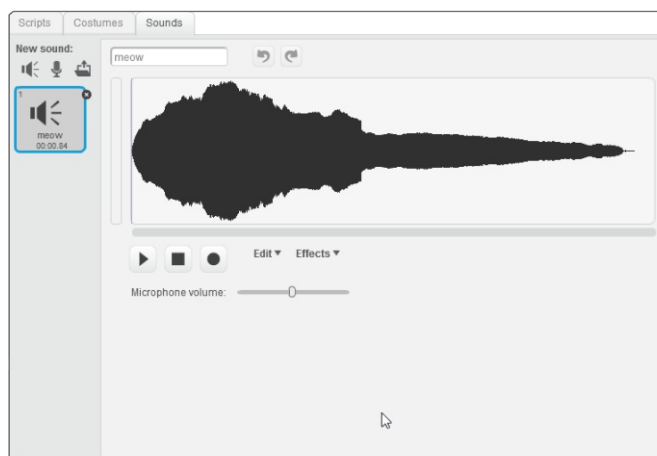


Figure 5-1. Sounds tab

To hear it, or any sound file in the Sounds tab, select the sound file's thumbnail to display the sound's waveform on the right side of the Sounds tab. Below it, you will find Play, Stop, and Record icons (see Figure 5-3). Click Play to hear the sound. In this same area, you can change the name of the sound file by clicking in the text field at the top, as well as edit and apply effects to the sound with the pull-down menus.

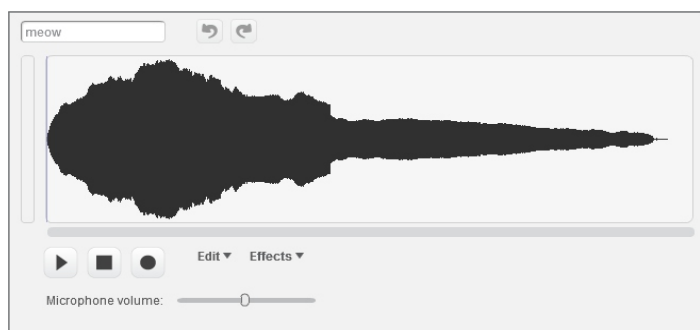


Figure 5-3. Sounds tab

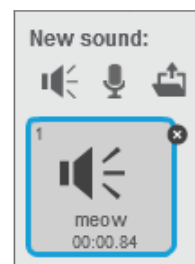







Figure 5-2. The **meow** sound is selected by default

The icons below **New sound** enable you to add sound files in three ways (see Figure 5-4). To select a sound from the library, simply click the  icon. To record a sound, click the  icon. To upload a sound file, click the  icon.

When you click the  icon, the Sound Library (see Figure 5-5) opens, displaying all the sound files that you can choose. To add a sound file to your script, all you need to do is select the file and click **OK** . The sound file will appear in the **Sounds** tab. You can also preview each sound file before adding it to your project by clicking the  icon belonging to the sound file in the Sound Library.

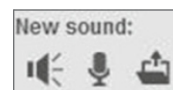


Figure 5-4. New sound icons

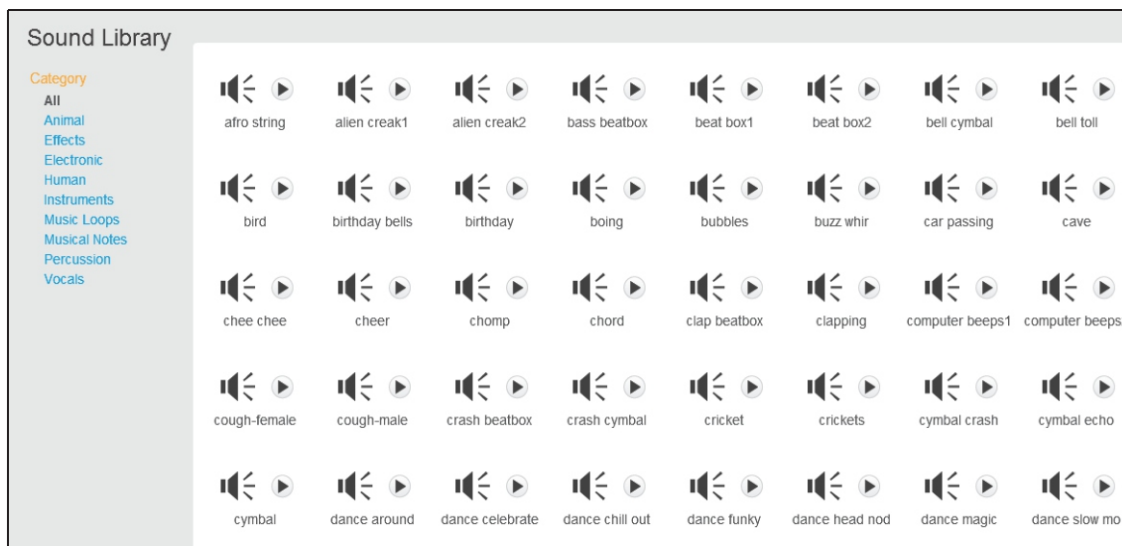




Figure 5-5. Sound Library

You can also create your own sound file by recording a sound. To do so, first click the  icon. When you do, Scratch adds a sound file called **recording1** to the **Sounds** tab (see Figure 5-6). The waveform window to the right is empty because the recording1 file doesn't yet contain any sound (see Figure 5-7). To add some, click the  icon and record your sound using your computer's microphone. You can always rename the file to something more descriptive using the text field on the top-right side. In Figure 5-8 's example, I recorded a sound and renamed it to **Cymbal crash**.

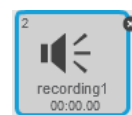


Figure 5-6. recording1

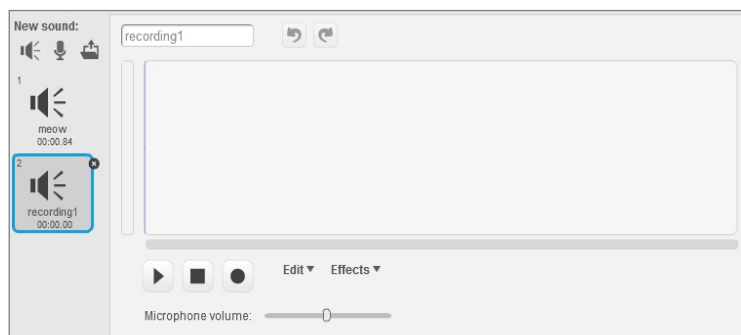



Figure 5-7. Empty sound file



Figure 5-8. Cymbal crash recorded sound

To upload an existing sound file to your Scratch project, click the  icon. A window opens where you can select the sound file. Navigate to where you have the sound file saved and click **Open** . Keep in mind that Scratch can only read WAV and MP3 sound files.

Sound Blocks

The blocks in the **Sound** category control sounds in a Scratch project (see Figure 5-9). Not only you can control the sound files that were added to the project, but you can also play several different musical instruments and music notes. You can adjust the tempo and the sound volume, as well.

Two blocks enable you to play the sounds loaded in your Sounds tab. The **play sound** **meow** block plays the sound that you select from the pull-down menu. In this activity, it plays the meow sound. If you have multiple sounds added to your project that are displayed in the **Sounds** tab, you can use the pull-down menu in the block to select another sound. The **play sound** **meow** **until done** block also plays the sound file that you choose from the pull-down menu. Unlike with the previous block, with this one, Scratch will not execute the next block of code until it has finished playing the sound. For example, if you want a sprite representing a car to move while an engine noise plays, you might choose the **play sound** block, but you'd choose the **play sound until done** block if you don't want the car to move until the door slam noise completes. To silence all of your sounds, use the **stop all sounds** block, which instructs the script to stop playing all sounds.

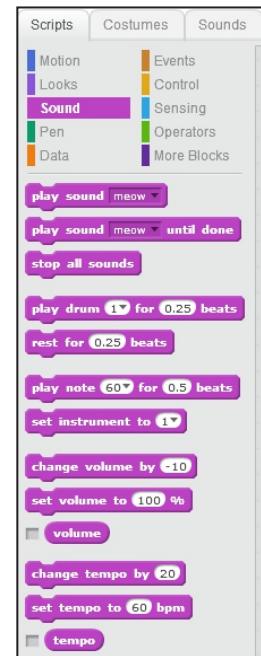


Figure 5-9. Sound Blocks

Several of the code blocks work together to enable you to play music. All music is based on a tempo, so you need to set one for your Scratch music too. You use the **set tempo to 60 bpm** block to set the tempo, which is the number of beats per minute that can occur. In this activity, there are 60 beats in a minute, so 1 beat is 1 second long. The more beats you have per minute, the shorter the beat. The fewer the beats per minute, the longer the beat lasts. You can later adjust the tempo to be faster or slower with the **change tempo by 20** block. Specifying a positive number speeds the tempo with more beats per minute (bpm), and a negative number slows the tempo with fewer beats. In the previous activity, 20 beats will be added to the current value for the tempo or bpm. The **tempo** block holds the value of the tempo in case you lose track. Select the box in front of this block in the blocks palette to display the current tempo in a monitor window on the stage. In addition to your tempo, you must also choose an instrument to play your music with the **set instrument to 1** block. There are 21 musical instruments that you can choose from. Each number corresponds to a musical instrument. Click the pull-down menu to display the list of musical instruments and see which number corresponds to which musical instrument. In the previous activity, 1 corresponds to **piano**. To instruct the specified instrument to play a note, use the **play note 60 for 0.5 beats** block to specify a note and a number of beats for which to play it. Each number corresponds to a note. Clicking the pull-down menu displays a keyboard and the music note corresponding to a number. In this activity, 60 corresponds to the **middle C** note.

If you need drums, use the **play drum 1 for 0.25 beats** block for the drum number you chose from the pull-down menu and enter the specified number of beats. There are 18 types of percussion instruments that you can choose from. Clicking the pull-down menu displays the list and the instrument that belongs to the specific number. In this activity, 1 belongs to **snare drum**. Similar to the **wait 1 secs** block or a rest in a musical score, the **rest for 0.25 beats** block pauses the script and does not play any sound for the specified number of beats. Finally, you can set and change the volume of your music and other sounds.

The **set volume to 100 %** block sets the sound volume to a specific level, with 100% as the default. Using the **change volume by -10** block is like twisting your volume control dial. A negative number decreases the volume and a positive number increases it. A value of 0 does not change the volume. The **volume** block holds the value of the sound volume. Select the box in front of it in the blocks palette to display a monitor on the stage.

Activities

So far, you have learned the theory of how to add sound to a Scratch project. Now it’s time to listen to what happens when you combine the blocks into scripts. The following examples will give you some practice with the sound blocks in action.

Activity 5-1: Meow

Giving your sprite a voice is simple, as you can see in Script 5-1 .





Drag the  block from the **Events** category, and then drag the  block from the **Sound** category and snap them together. Finally, choose **meow** from the **play sound** block’s drop-down menu. When the user clicks the green flag, the next block will play the specified meow sound. **Table 5-1** lists the blocks and describes the actions used in this activity.



Table 5-1. Code Blocks in Meow

Blocks	Actions
	Clicking the green flag activates the script. The green flag is the trigger to start the script running.
	Play the meow sound.




Activity 5-2: Say Meow

If you combine a speech bubble with a sound, everyone will know who is talking. You just need to add one extra block of code to Activity 5-1’s script.

When the user clicks the green flag, the script activates. The next block plays the meow sound. The last block creates a speech bubble for the cat, which displays Meow for 2 seconds.

Table 5-2 lists the blocks and describes the actions used in this activity.



Blocks	Actions
	Clicking the green flag activates the script. The green flag is the trigger to start the script running.
	Play the meow sound.
	The sprite gets a speech bubble that says Meow for 2 seconds.

Activity 5-3: Play Sound Until Done

To better understand the difference between the `play sound meow` used in Activity 5-2 and the `play sound meow until done` block used in this activity, create Script 5-3 and observe what happens when you click the green flag to run it. Did you notice the difference between this script and the previous one? Script 5-2 starts playing the **meow** sound and displays the speech bubble immediately before the sound has finished playing. Script 5-3 plays the sound all the way to the end and then displays the speech bubble only after the sound has finished playing. **Table 5-3** lists the blocks and describes the actions used in this activity.

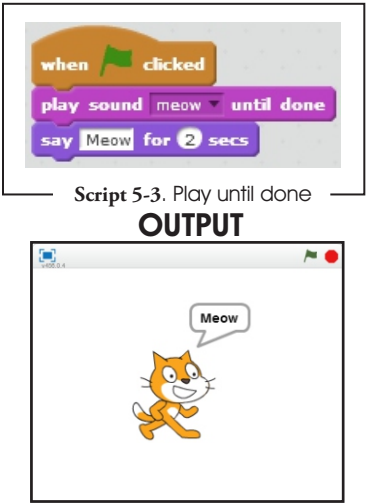


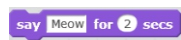


Table 5-3. Code Blocks in Play Sound until Done

Blocks	Actions
	Clicking the green flag activates the script. The green flag is the trigger to start the script running.
	Play the meow sound until done and then move to the next block.
	The sprite gets a speech bubble that says Meow for 2 seconds.

Activity 5-4: Change Volume

By adding a `repeat 20` block, you can extend a sound by repeating it. As you can see in Script 5-4, this script uses the pop sound. Before creating the script, remember to select the **pop** sound in the library and add it to the **Sounds** tab, so that it will be available from the `play sound pop` block's pull-down menu. If you don't select a sound from the library first, it will not be available in the block's pull-down menu.

After the user clicks the green flag, the script starts in silence, because the `set volume to 0 %` block specifies 0% volume. The `repeat 20` block is set to repeat the sequence of actions within it 20 times. The first action in the sequence increases the volume by the specified amount (5%). The next block plays the selected sound (pop), the script pauses for 1 second, and then the sequence of actions within the C block repeats. Because each time through the sequence the volume increases by 5%, 20 repeats increases the volume to 100% by the end of the script. **Table 5-4** lists the blocks and describes the actions used in this activity.

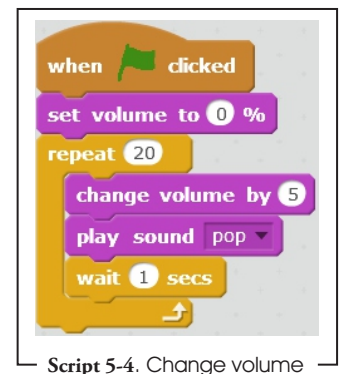





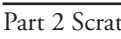


Table 5-4. Code Blocks in Change Volume

Blocks	Actions
	Clicking the green flag activates the script. The green flag is the trigger to start the script running.
	Turn the volume all the way down.
	Repeat the actions represented by the blocks within this block 20 times.
	Increase the volume by 5%.
	Play the pop sound.
	The script waits 1 second. No actions are performed for 1 second.

Activity 5-5: Let's Waltz

This script plays the rhythm of a waltz . By experimenting with the different instruments, tempo, and beats, you can create your own rhythms and songs. Script 5-5 starts running when the user clicks the green flag. The next block sets the tempo to 100 beats per minute. The next block will repeat the sequence of actions within it 10 times. The first action in the sequence plays the bass drum (drum number 2) for 0.25 beats. After a silent pause of 0.25 beats, the next two blocks in the sequence play the **open hi-hat** (drum number 5) for 0.5 beats each. Run the script and listen. Sounds like a waltz rhythm, doesn't it?

Table 5-5 lists the blocks and describes the actions used in this activity.

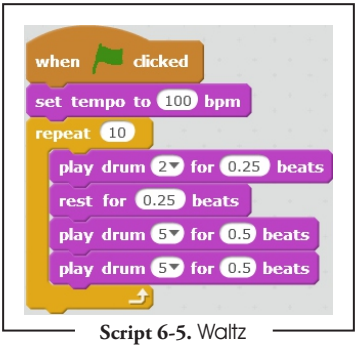


Table 5-6. Code Blocks in Change Tempo

Blocks	Actions
	Clicking the green flag activates the script. The green flag is the trigger to start the script running.
	Set the tempo to 100 beats per minute.
	Repeat the actions represented by the blocks within this block 20 times.
	Play bass drum for 0.25 beats.
	Don't play anything for 0.25 beats.
	Play open hi-hat for 0.5 beats.
	Play open hi-hat for 0.5 beats.

Activity 5-6: Change Tempo

Script 5-6 shows how changing the tempo while running a script affects the sound.

Script 5-6 starts when the user clicks the green flag. The next block sets the tempo to 20 beats per minute. The block then repeats the sequence of actions within it 50 times. The first block in the sequence plays the snare drum (drum number 1) for 0.25 beats, and then the bass drum (drum number 2) plays for 0.25 beats. The third block in the sequence makes the script stop playing any sound for 0.25 beats. The last block in the sequence increases the tempo by 10 beats per minute. So, each repeat through the loop increases the tempo.

Table 5-6 lists the blocks and describes the actions used in this activity.

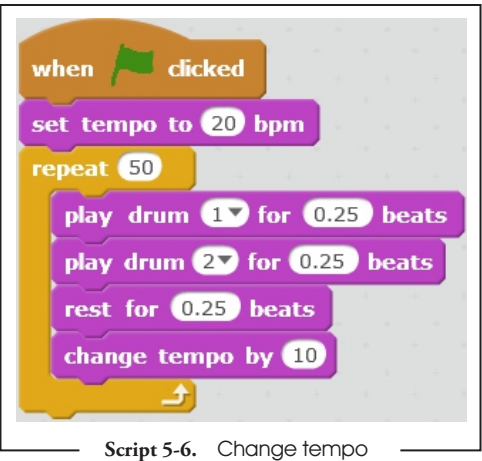


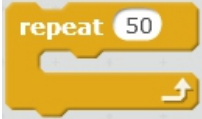



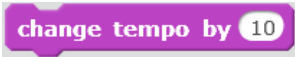


Table 5-6. Code Blocks in Change Tempo

Blocks	Actions
	Clicking the green flag activates the script. The green flag is the trigger to start the script running.
	Set the tempo to 20 beats per minute.
	Repeat the actions represented by the blocks within this block 50 times.
	Play snare drum for 0.25 beats.
	Play bass drum for 0.25 beats.
	Don't play anything for 0.25 beats.
	Increase the tempo by 10 beats per minute.

Activity 5-7: Nursery Rhyme

This activity demonstrates how you can create songs with Sound blocks. In fact, it's a lot like playing a musical instrument. In Script 5-7, you'll play part of the “Frère Jacques” (“Brother John”) nursery rhyme with Scratch’s vibraphone.

The script begins when the user clicks the green flag. The next block sets the volume to 100%, which is all the way up. If it's too loud, you can lower the volume by setting a smaller number in the block. Block sets the musical instrument to the vibraphone (instrument number 14).



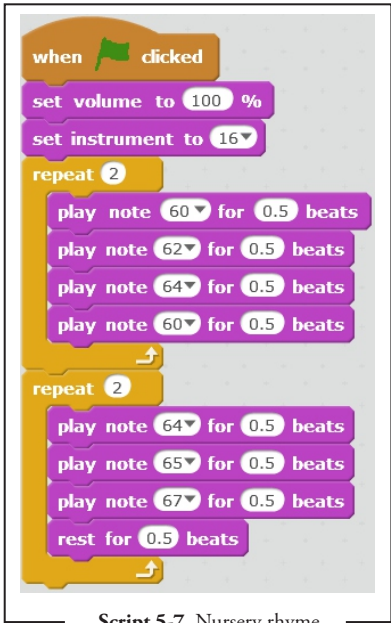
The first  block then repeats the sequence of actions within it twice. Specifically, each time through the loop, the notes C, D, E, and then C play for 0.5 beats each in sequence. The second repeat block then also repeats the sequence of actions that it contains twice, playing the notes E, F, and G for 0.5 beats each. After you run the script, try changing the instrument to see how it affects the sound. Or, if you're musically inclined, try scripting a different tune. Maybe the cat would enjoy “Three Blind Mice”. Table 5-7 lists the blocks and describes the actions used in this activity.

Table 5-7. Code Blocks in Nursery Rhyme

Blocks	Actions
	Clicking the green flag activates the script. The green flag is the trigger to start the script running.



Script 5-7. Nursery rhyme

set volume to 100 %

Turn the volume all the way up.

set instrument to 16

Select vibraphone as the instrument.

repeat 2

Repeat the actions represented by the blocks within this block 2 times.

play note 60 for 0.5 beats

Play the middle C note for 0.5 beats.

play note 62 for 0.5 beats

Play the D note for 0.5 beats.

play note 64 for 0.5 beats

Play the E note for 0.5 beats.

play note 60 for 0.5 beats

Play the middle C note for 0.5 beats.

repeat 2

Repeat the actions represented by the blocks within this block 2 times.

play note 64 for 0.5 beats

Play the E note for 0.5 beats.

play note 65 for 0.5 beats

Play the F note for 0.5 beats.

play note 67 for 0.5 beats

Play the G note for 0.5 beats.

rest for 0.5 beats

Don't play anything for 0.5 beats.

Activity 5-8: The Marching Cat

It's time to combine several of the techniques you've learned—movement, costume changes, and sound into a more complete story. In this activity, you'll make the cat march back and forth across the stage to the accompaniment of drums playing at varying volumes.





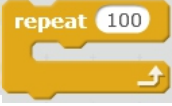

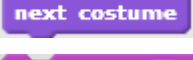


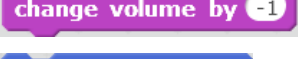







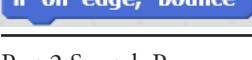
Script 5-8 activates when the user clicks the green flag. After a Sound block sets the volume to 100%, two Motion blocks make the sprite face to the right and set the rotation style so that the sprite can face left or right only.

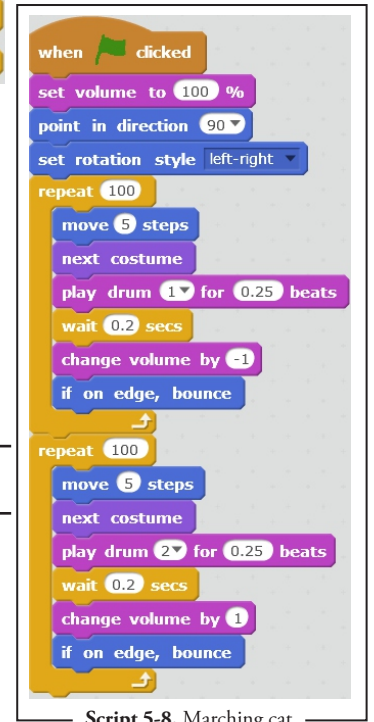
repeat 100

The two blocks contain the core of the script's instructions. The first one repeats the sequence of actions within it 100 times. The first block within the sequence makes the sprite move 5 steps in the direction that it's facing. The sprite changes to its next costume, and then the snare drum (drum number 1) plays for 0.25 beats. The script pauses for 0.2 seconds, and then the volume decreases by 1%. The final block in the sequence checks if the sprite has reached the edge of the stage and bounces it back in the opposite direction, if necessary. The action then loops back to the first block in the sequence.

After the final repeat of the first C block, the script moves to the second block to repeat the sequence of actions within it 100 times. The first block in its sequence moves the sprite 5 steps in the direction that it's facing. The next block changes the sprite to its next costume. Next, the bass drum (drum number 2) plays for 0.25 beats, and then the script pauses for 0.2 seconds. The next block increases the volume by 1% and the last block in the loop makes sure that if the sprite reaches the edge of the stage, it bounces back in the opposite direction.

Table 5-8 lists the blocks and describes the actions used in this activity.

Blocks	Actions
	Clicking the green flag activates the script. The green flag is the trigger to start the script running.
	Turn the volume all the way up.
	Make the sprite face to the right.
	Set the rotation style of the sprite so that it can only face left or right.
	Repeat the actions represented by the blocks within this block 100 times.
	Move the sprite 5 pixels in the direction that it's facing.
	Change the sprite to the next costume in the Costumes tab.
	Play snare drum for 0.25 beats.
	The script waits 0.2 seconds. No actions are performed for 0.2 seconds.
	Decrease volume by 1%.
	If the sprite reaches the edge of the stage, bounce in the opposite direction.
	Repeat the actions represented by the blocks within this block 100 times.
	Move the sprite 5 pixels in the direction that it's facing.
	Change the sprite to the next costume in the Costumes tab.
	Play bass drum for 0.25 beats.
	The script waits 0.2 seconds. No actions are performed for 0.2 seconds.
	Increase volume by 1%.
	If the sprite reaches the edge of the stage, bounce in the opposite direction.



Activity 5-9: Playing Drums

Script 5-9 simulates playing drums. This script is almost the same as Scripts 5-5 and 5-6 , but it shows another variation of a drum sequence. Remember that you can adjust it to your liking, so you play your own drum sequence.

The script starts running when the user clicks the green flag. The first block repeats the sequence of actions within it 3 times. The block in the sequence is to play the snare drum (drum number 1) for 1 beat. After a rest in which nothing plays for 0.25 beats, the third block in the sequence plays the snare drum again for 1 beat. After another silent rest for 0.25 beats, the bass drum (drum number 2) plays for 0.25 beats. The last block in the sequence pauses the script for 1 second.

When all three repeats are complete, the script moves to the second block, which repeats the actions within it 2 times. The first block in the sequence plays the crash cymbal (drum number 4) for 1 beat. The next block pauses the script for 0.5 seconds. The last block in this repeating loop plays the crash cymbal again for 1 beat. Go ahead. Create the script and run it.

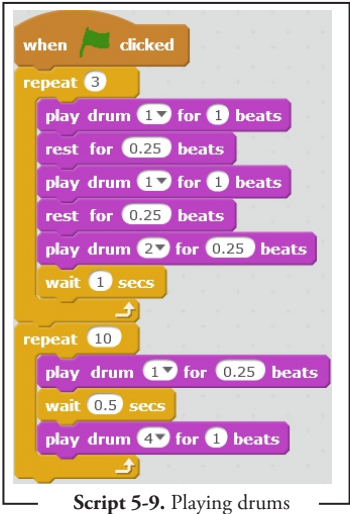


Table 5-9 lists the blocks and describes the actions used in this activity.


Blocks	The bass drum
	Clicking the green flag activates the script. The green flag is the trigger to start the script running.
	Repeat the actions represented by the blocks within this block 3 times.
	Play snare drum for 1 beat.
	Don't play anything for 0.5 beats.
	Play snare drum for 1 beat.
	Don't play anything for 0.5 beats.
	Play bass drum for 0.25 beats.
	The script waits 1 second. No actions are performed for 1 second.
	Repeat the actions represented by the blocks within this block 2 times.
	Play crash cymbal for 1 beat.
	The script waits 0.5 seconds. No actions are performed for 0.5 seconds.
	Play crash cymbal for 1 beat.

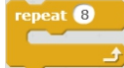

Activity 5-10: Galloping Horse

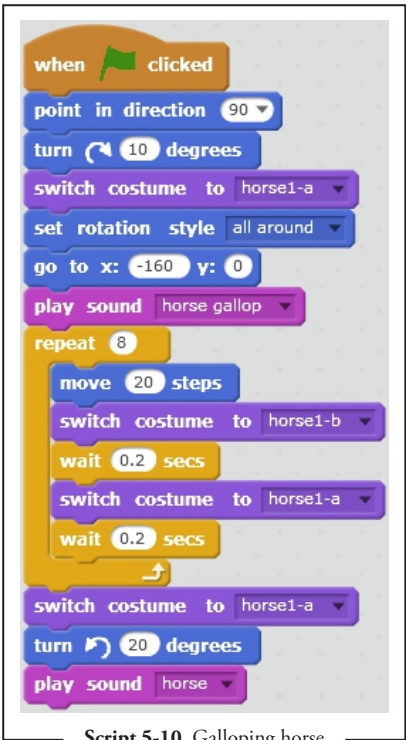
Are you ready to tell another story? In this activity, you'll make a horse gallop across the stage to the sound of hoof beats, and then stop, rear, and neigh in the middle of the stage. It may sound complicated, but scripting these actions in Scratch is easier than instructing a real horse to do them.

Before creating Script 5-10, make sure that you have all the elements that you need. Add the **Horse1** sprite from the Sprite Library (see Figure 5-11). This sprite consists of two costumes, which will be displayed in the Costumes tab (see Figure 5-12). You can delete any other sprite from the stage. Also, add the **horse gallop** and **horse** sounds from the Sound Library to the Sounds tab.

The script starts running when the user clicks the green flag. The next pair of blocks makes the horse face to the right, and then rotates 10 degrees clockwise. The fourth block switches the costume to **horse1-a**. The next block sets the rotation style to **all around**, so the horse is able to turn around its axis. The next block moves the horse to the position (–160, 0). The next block plays the sound **horse gallop**.

The  block then repeats the sequence of actions within it 8 times. The sequence moves the horse 20 steps in the direction that it's facing, switches the sprite to the **horse1-b** costume, pauses the script for 0.2 seconds, switches the sprite to the **horse1-a** costume, and then pauses the script for 0.2 seconds again.

After the final loop through the  block sequence, the next block switches the sprite to the **horse1-b** costume. The  block then rotates the horse 20 degrees counterclockwise and the final block in the script plays the **horse** sound (see Figure 5-10). **Table 5-10** lists the blocks and describes the actions used in this activity.



Script 5-10. Galloping horse

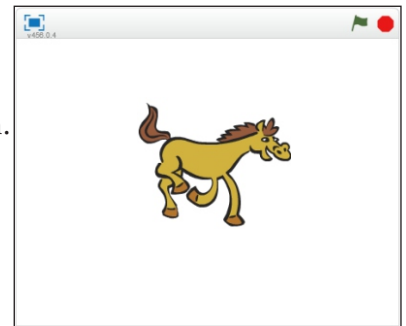


Figure 5-12. Result of Script 6-10

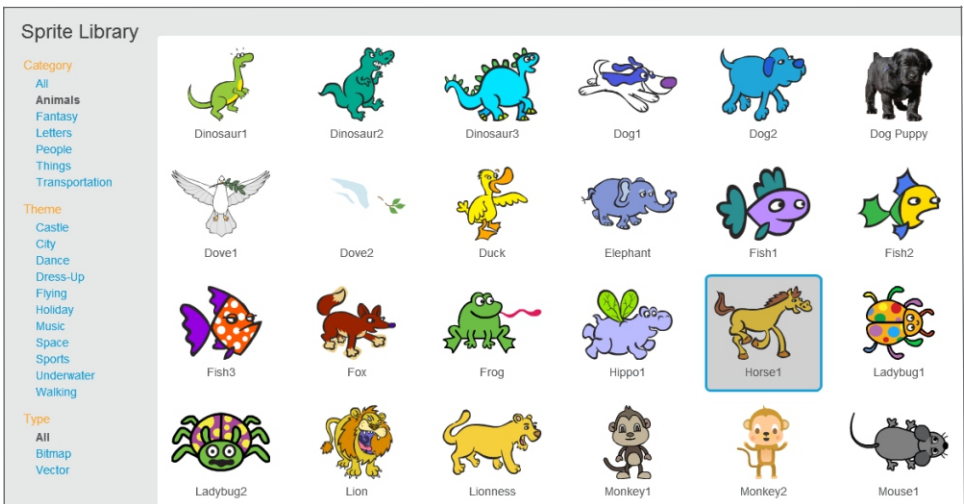






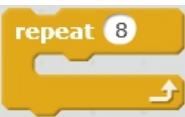










Figure 5-10. The Horse1 sprite in the Sprite Library



Figure 5-11. The Costumes tab

Table 5-10. Code Blocks in Galloping Horse

Blocks	Actions
	Clicking the green flag activates the script. The green flag is the trigger to start the script running.
	Make the sprite face to the right.
	Turn the sprite clockwise 10 degrees.
	Switch the sprite to the horse1-a costume.
	Set the rotation style of the sprite so that it can rotate all around its axis.
	Move the sprite to the position where X = -160 and Y = 0.
	Repeat the actions represented by the blocks within this block 8 times.
	Move the sprite 20 pixels in the direction that it's facing.
	Switch the sprite to the horse1-b costume.
	The script waits 0.2 seconds. No actions are performed for 0.2 seconds.
	Switch the sprite to the horse1-a costume.
	The script waits 0.2 seconds. No actions are performed for 0.2 seconds.
	Switch the sprite to the horse1-b costume.
	Turn the sprite counterclockwise 20 degrees.
	Play the horse sound.

Summary

In this chapter, you learned how to add sound to a Scratch project and to control sound in a Scratch project. You now have all the basic knowledge to create some cool projects in Scratch. You know how to add sprites and backdrops. You know how to move the sprite and change its appearance, create speech and thought bubbles, and add sound to a project. Before you move on, try creating some stories of your own using other sounds and sprites. Have some fun!

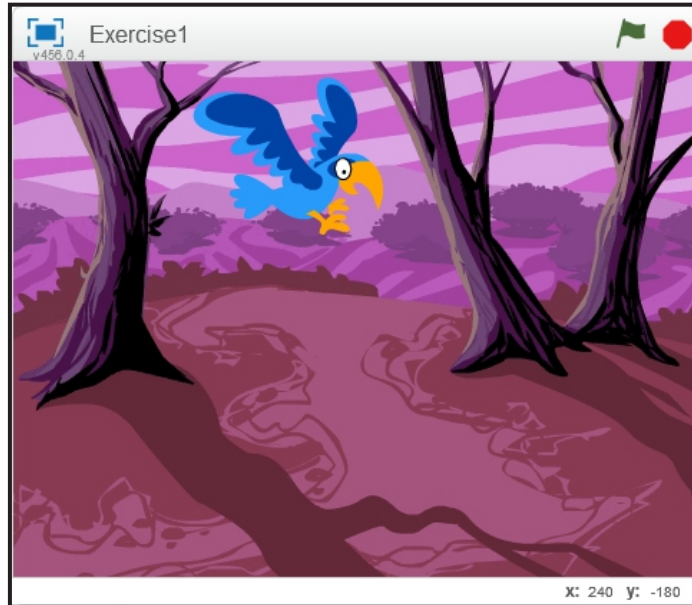
This chapter completes the first part of this book, which taught you basic Scratch knowledge. The next chapter starts the second part of the book, which covers advanced concepts that are also used in high-level computer programming languages.

Snap Script

a Short hands-on activity

1. Create a script to play the sound called **bird** . Set the volume at 100% and each time you play the sound decrease the volume by 10% until the sound level is 0.

Output:



2. Create a script and set the instrument to **piano**. Play notes C, D, and E. Set the instrument to **cello** and play the notes E, D, and C.

Output:

