PYTHON FOR MUSICIAN

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Content

What is EarSketch?

- EarSketch is a platform that allows you to code music sound samples (clips).
- EarSketch uses the same kind of digital audio workstation (DAW) software used throughout the music industry.
- EarSketch provides the opportunity to make music that is unique to you.
- One way to achieve this is by adding audio effects to your music, similar to how a photographer may add a filter to a photo.
- Effects can allow your music to change over time, creating interesting variations during the course of a song.
- A song built in EarSketch is typically made up of a series of sections. These sections are linked by transitions, special techniques that grab the listener's attention.

Tools of the Trade: DAWs and APIs

- The **Digital Audio Workstation**, or **DAW**, is the main tool for producing music on a computer.
- A DAW is specialized computer software for recording, editing, and playing digital audio files.
- In the context of a DAW, these audio files are called **clips**.
- The DAW allows you to edit and combine multiple clips simultaneously on a musical timeline, making it easy to synchronize and visualize different parts.
- Some popular DAWs include Pro Tools and LogicPro, GarageBand, and Reaper.

API

- Programming languages come with a set of built-in tools, most of which are general-purpose.
- EarSketch adds extra tools to this set to help us accomplish our specific goal of making music.
- This collection of tools is called an **Application Programming Interface**, or **API**.
- Other examples of APIs include –

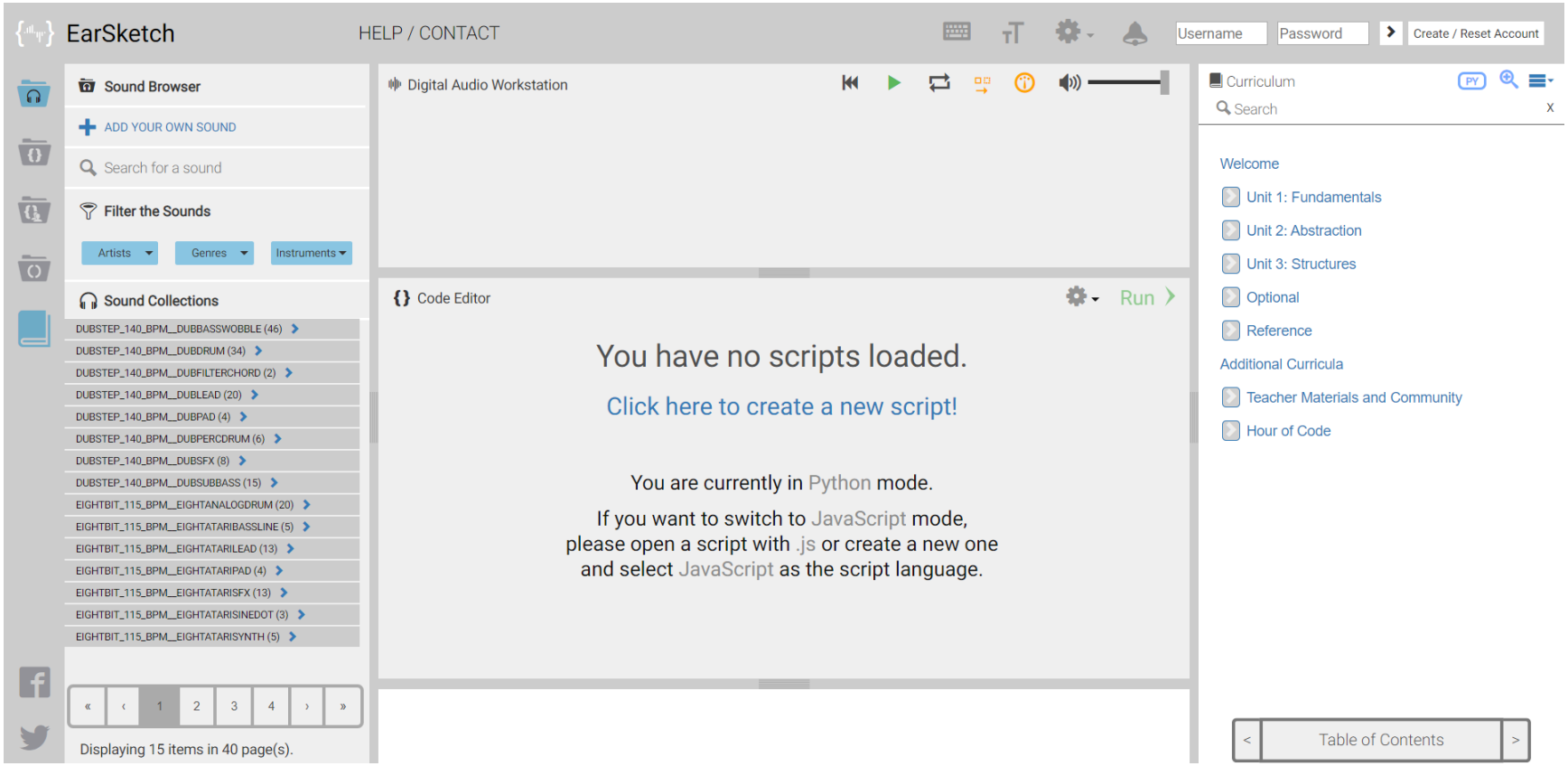
Google Maps API (a set of tools for embedding maps into websites or apps)

YouTube API (tools for embedding YouTube videos in websites).

what exactly is EarSketch?

- **EarSketch is a DAW** with extra features: *the ability to place audio clips into a DAW timeline using computer code*.
- This opens up musical possibilities that are difficult or impossible to create with a regular DAW, and makes many tasks much faster.
- In EarSketch, we focus on creating output in the form of digital audio, which you can listen to in the browser or save to your computer.

The EarSketch Workspace



The EarSketch Workspace

Different sections of the EarSketch workspace:

- **Accounts** (top right): Log in, create an account, or reset your password.
- **Sound Browser**: Browse or search 4,000 audio clips to use in your music, made by musicians/producers Young Guru and Richard Devine. You can also record your own sounds or upload sound files you already have.
- **Scripts Browser**: When you write code in EarSketch, your scripts are automatically saved to the EarSketch server. Go here to find your saved scripts, open them, export them as WAV or MP3 audio files, and share them with others.
- **Share Browser**: When you open an EarSketch script shared with you by someone else, this will show you information about the script and additional options.

The EarSketch Workspace

- **API Browser**: Information on every EarSketch function.
- **Digital Audio Workstation (DAW)**: A timeline view of your current song, showing which audio clips you have added to the song and when they come in. It lets you hear your song and visualize its structure.
- **Code Editor**: A text editor with numbered lines. Type your code here, press "Run", and it will turn into music in the DAW.
- **Console**: The console displays important information about your code as it runs, including the location of errors in your code. It is a common and important feature in programming tools.
- **Curriculum**: The current active panel. Here, you can learn how to make music with code.

Running a Script

The basic workflow for making a song in EarSketch follows:

- type your musical code into the code editor,
- press the *run* button to execute the code and
- add the music to the DAW, and
- press *play* in the DAW to hear it.

Adding Comments

- The computer does not execute a line of code that is preceded by #.
- This is called a **comment**.
- Comments are used by programmers to make notes on their code for them or other programmers to read later.

DAW in Detail

The DAW consists of several items:

- **Playhead:** The red line, which represents your playback location in the timeline. The play button will start playback at the playhead's location.

- **Transport Controls:** The buttons at the top right of the DAW. You've probably seen most of these in a media player like iTunes. From left to right, the buttons are

  1. **Reset:** Press to jump the playhead back to the beginning.
  2. **Play/Pause:** Press this to hear the music you've added. Playback begins at the playhead.
  3. **Mute:** Toggles sound on and off.

DAW in Detail

4. **Volume Slider:** Adjust the volume of playback by moving the slider.
5. **Loop:** When the playhead reaches the end of the timeline, automatically start playing from the beginning again.
6. **Toggle Metronome:** Play a click track over your music.

- **Measure Numbers:** At the top of the DAW timeline, there is a horizontal series of whole numbers. If this were a normal timeline, the numbers would represent minutes and seconds; however, here they represent measure numbers. A **measure** is a unit of musical time that depends on the speed (a.k.a. **tempo**) of a song. The tempo has to be specified in every script. For now, think of a measure as a block of time. This is how we tell EarSketch where to place our audio clips. Click on a measure number to move the playhead to it.

DAW in Detail

- **Audio Clips:** If you have added music to the DAW, the DAW should display some boxes with squiggly lines inside. These are audio clips. They provide a visual representation of the sounds they contain.

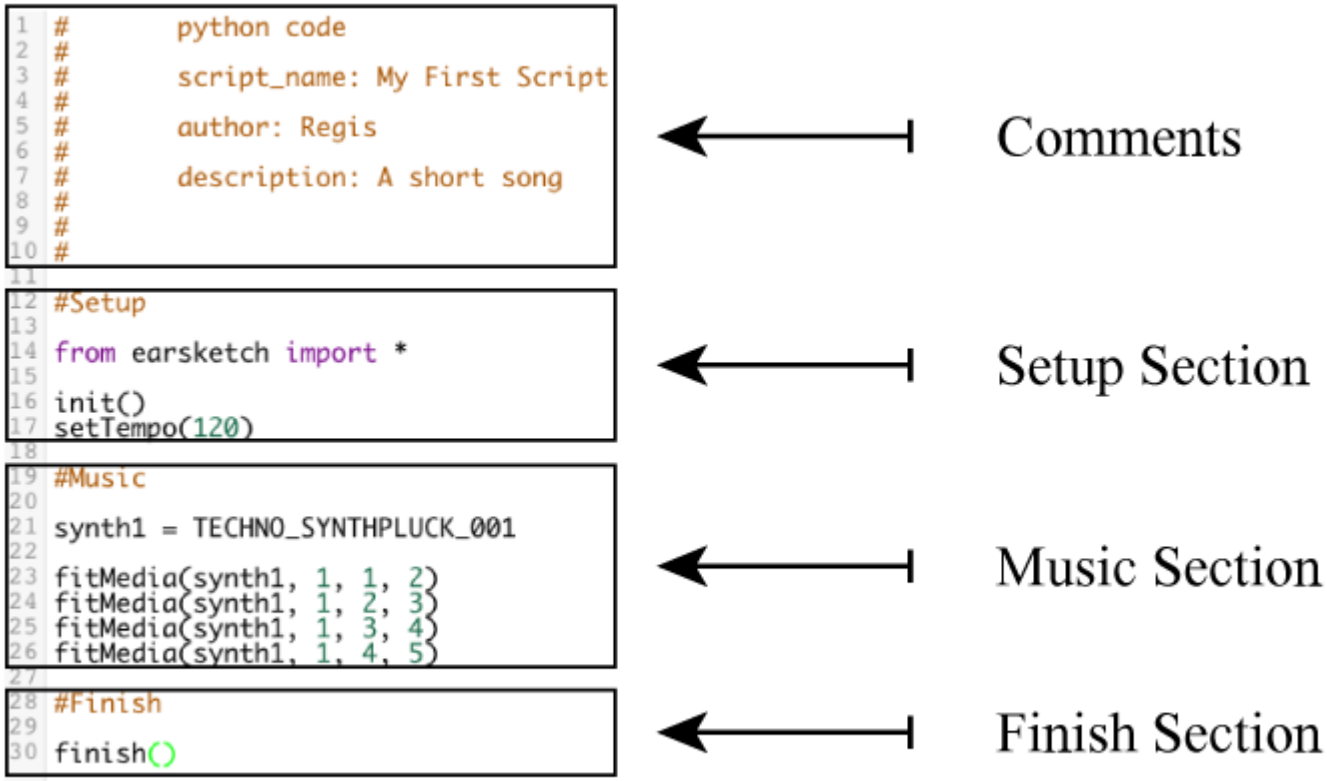
- **Tracks:** Every audio clip is placed on a specific track. Tracks are the rows that run across the DAW; they are numbered on the left. Tracks help you organize your sounds by instrument-type; for example, you would record each instrument (vocals, lead guitar, rhythm guitar, bass, drums, etc.) on a separate track in a recording studio. You can only have one audio clip at a given time on each track. So, having multiple tracks also means you can overlap them.

- **Effects Toggle:** Show or hide the effects added on each track, if any. Note that the effects will still play back; the toggle is just for visuals.

- **Solo/Mute:** Next to each track number, the "S" and "M" stand for solo and mute. Mute turns off playback for that track, and Solo turns off playback for all other tracks.

Sections of an EarSketch Script

- In EarSketch, we will structure all of our sample projects in roughly the same way: as 4 sections marked by comments, each with a different purpose:



Sections of an EarSketch Script

- **Comments Section**

  You can use comments anywhere in your code, but a block at the top is usually used to describe the whole project.

- **Setup Section**

  This code tells the DAW how to prepare to make music. init() initializes, or turns on, the DAW. setTempo() allows you to choose a tempo for the project, which can be anywhere from 45 to 220 beats per minute. from earsketch import * adds the EarSketch API to the project. Every project with music in it *must have* these parts in the setup section.

- **Music Section**

  The most important section. All of the details of your composition go here.

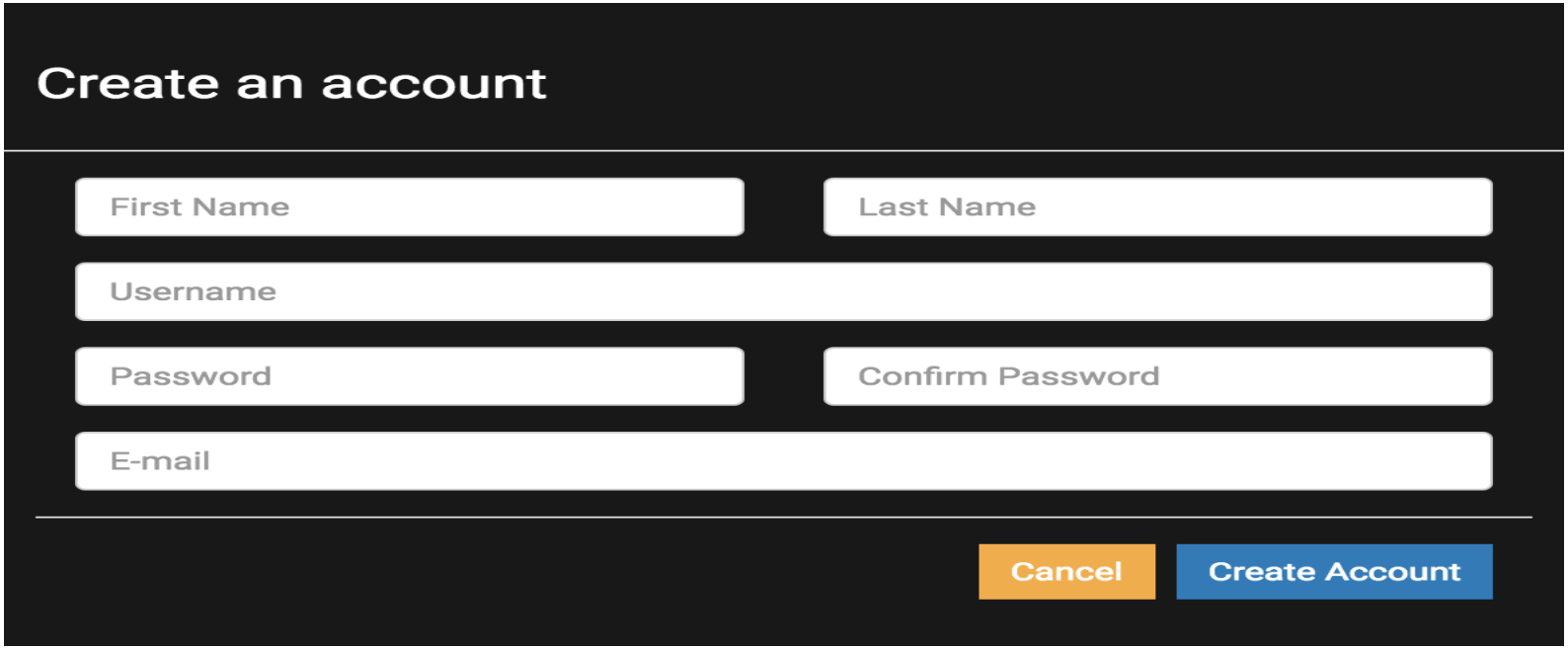
- **Finish Section**

  Every project *must have* a finish() function at the end. It tells the DAW that you are done composing and are ready to play your music.

Creating a New Script

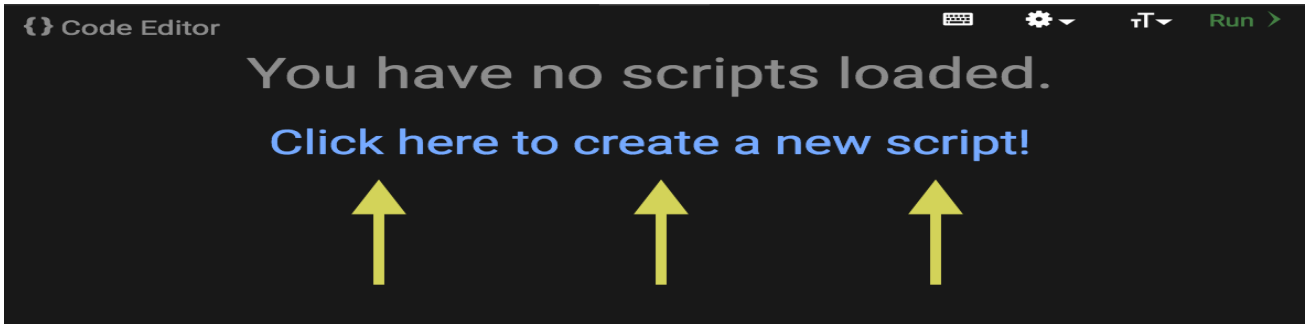
The following steps walk through how to create a new script in EarSketch.

1. Sign in or create a new account



Creating a New Script

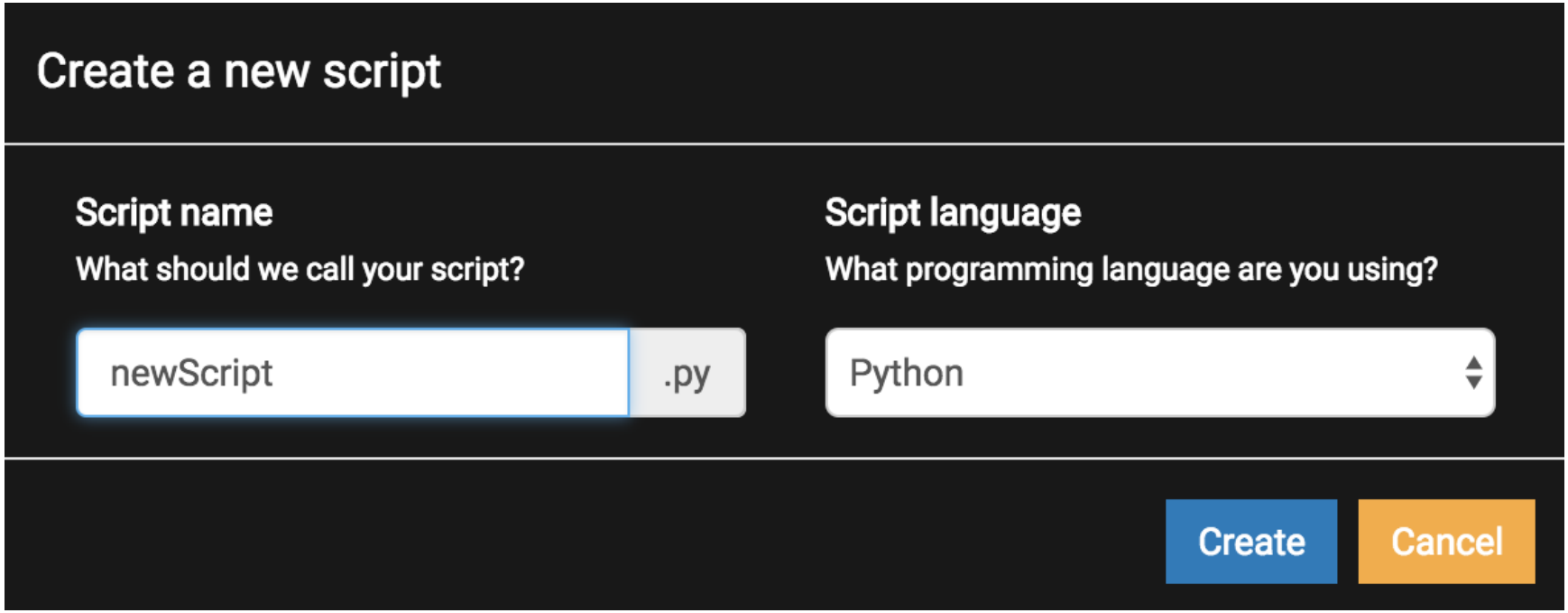
2. Click to create: If you don't have any scripts open (i.e. the code editor is empty), you will see a large blue link in the middle of the code editor. This is shown in the figure below. Click that link to proceed.



- If you have a script open already, then click on the "+" icon in the top right of the code editor. The icon's location is shown in the figure below.

Creating a New Script

3. Choose a name and language: When the "Create a new script" dialog box opens (shown in the figure below), give your new script a descriptive name and select your preferred programming language (Python or Javascript). Finally, click the "Create" button.



Creating a New Script

4. Fill in the comments section: After your new script has been created, take a minute to fill in the comments section. Give your script an appropriate title, add your name, and write a short description of what it will do.

Composing In EarSketch

Steps-

1. Add fitMedia():

- To add a sound clip to the DAW, we start by typing fitMedia() anywhere between setTempo() and finish().
- By itself, fitMedia() doesn't do anything;
- we also need to specify the *clip name* to add to our DAW, the *track number* to place the clip on, and the *starting* and *ending* points of our clip.
- We will now specify these details between the parentheses of fitMedia().

eg

- #Music fitMedia(Y18_DRUM_SAMPLES_2, 1, 1, 5)

Composing In EarSketch

2. **Choose a clip and paste it into fitMedia():**

- Open the sound browser.
- Listen to a few clips using the play button and pick one you like.
- We want to paste this clip's name into fitMedia().
- Click so that your cursor is inside of fitMedia()'s parentheses.
- Back in the sound browser, click the paste button (clipboard) next to your chosen clip.
- You should now have something like fitMedia(Y18_DRUM_SAMPLES_2) in your script.

Composing In EarSketch

3. Choose a track and start/end points: fitMedia() still needs a bit more information to do anything:

- After the *clip name* in the parentheses, type a comma, then the *track number:* 1.
- Type another comma, then a *start measure*: 1.
- Type another comma, then the *end measure*: 5.
- You should now have something like this:

  fitMedia(Y18_DRUM_SAMPLES_1, 1, 1, 5).
- A more general way to think about this is as

  fitMedia(clipName, trackNumber, startMeasure, endMeasure).
- Note that every piece of information in the parentheses MUST be separated by commas.

Composing In EarSketch

4. Press Run and Play:

- Press *Run* to execute the script.
- Your chosen clip should be added to the DAW.
- Press play in the DAW and have a listen!

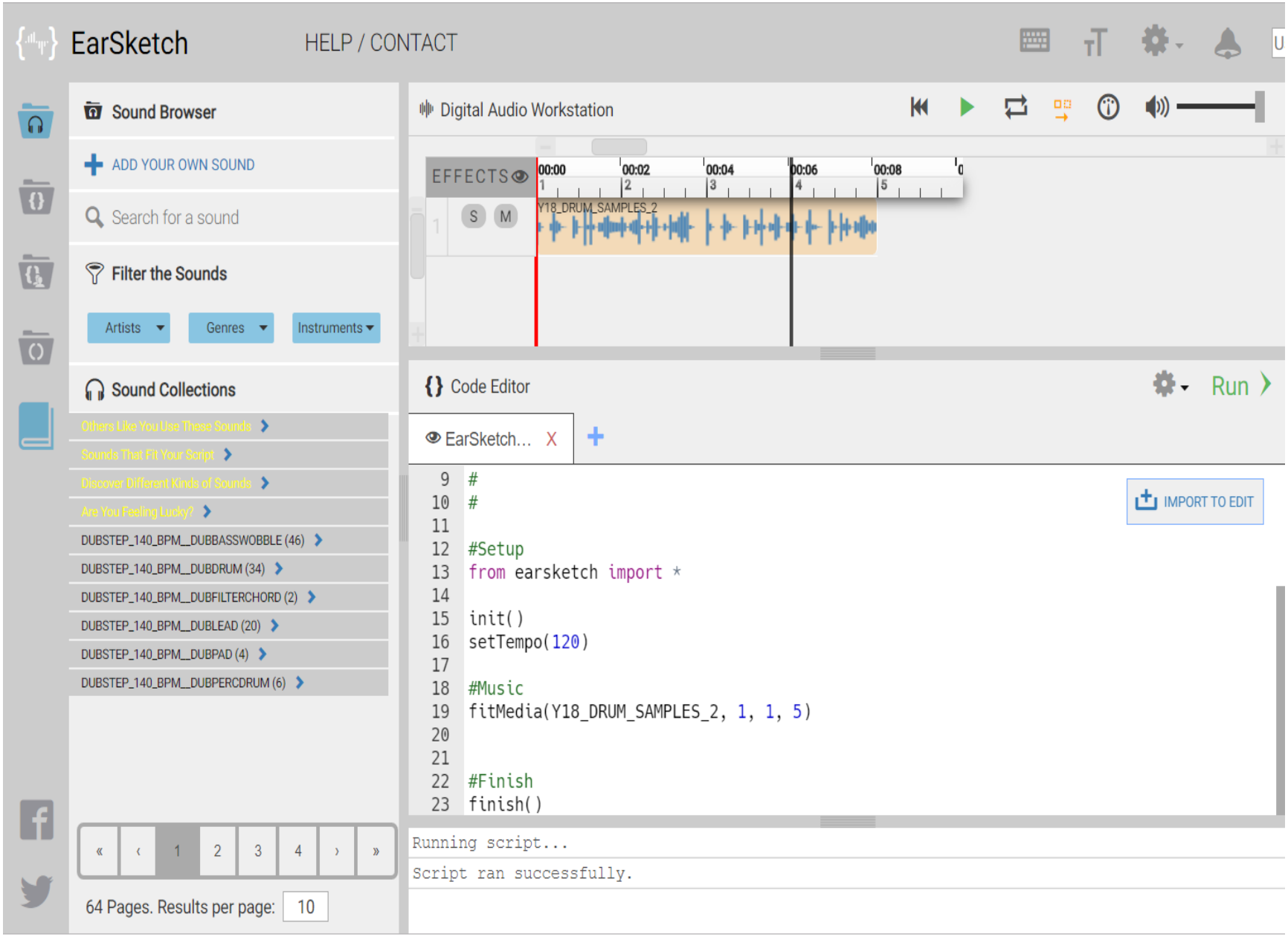
Note-

- Python is **case-sensitive**,
- script follow a convention called **camel-caps**: the first word is lower case, and subsequent words are capitalized, as in exampleFunctionName() .

Composing In EarSketch

- Code-

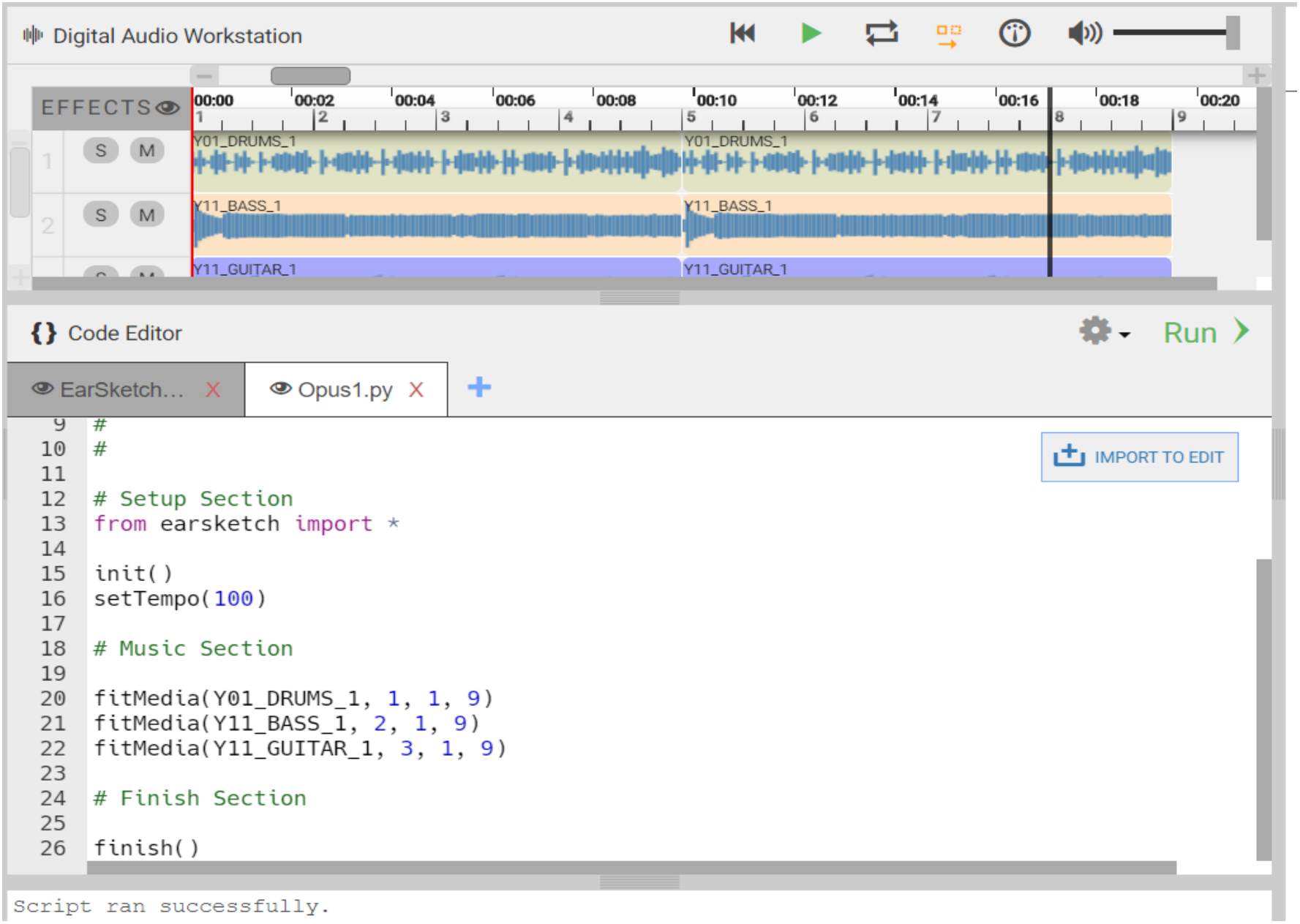
```
# python code
# script_name: EarSketch Demo
# author: The EarSketch Team
# description: Using fitMedia() to add a clip to the DAW.
#Setup from earsketch import *
init() setTempo(120)
#Music
fitMedia(Y18_DRUM_SAMPLES_2, 1, 1, 5)
#Finish
finish()
```


EarSketch
HELP / CONTACT
Sound Browser
ADD YOUR OWN SOUND
Search for a sound
Filter the Sounds
Artists
Genres
Instruments
Sound Collections
Others Like You Use These Sounds
Sounds That Fit Your Script
Discover Different Kinds of Sounds
Are You Feeling Lucky?
DUBSTEP_140_BPM_DUBBASSWOBBLE (46)
DUBSTEP_140_BPM_DUBDRUM (34)
DUBSTEP_140_BPM_DUBFILTERCHORD (2)
DUBSTEP_140_BPM_DUBLEAD (20)
DUBSTEP_140_BPM_DUBPAD (4)
DUBSTEP_140_BPM_DUBPERCDRUM (6)
« ‹ 1 2 3 4 › »
64 Pages. Results per page: 10
Digital Audio Workstation
EFFECTS
00:00 00:02 00:04 00:06 00:08
S M
Y18_DRUM_SAMPLES_2
Code Editor
Run
EarSketch... X
IMPORT TO EDIT
9 #
10 #
11
12 #Setup
13 from earsketch import *
14
15 init()
16 setTempo(120)
17
18 #Music
19 fitMedia(Y18_DRUM_SAMPLES_2, 1, 1, 5)
20
21
22 #Finish
23 finish()
Running script...
Script ran successfully.

Composing In EarSketch

- add more fitMedia() calls to your script like we do below. Notice that we use a different track number for each fitMedia() call:

```
# python code
#
# script_name: Opus 1
#
# author: The EarSketch Team
#
# description: Using multiple fitMedia( ) calls, on different tracks and with different clips.
#
#
#

# Setup Section
from earsketch import *

init()
setTempo(100)

# Music Section

fitMedia(Y01_DRUMS_1, 1, 1, 9)
fitMedia(Y11_BASS_1, 2, 1, 9)
fitMedia(Y11_GUITAR_1, 3, 1, 9)

# Finish Section

finish()
```


Digital Audio Workstation
EFFECTS
00:00
00:02
00:04
00:06
00:08
00:10
00:12
00:14
00:16
00:18
00:20
Y01_DRUMS_1
Y11_BASS_1
Y11_GUITAR_1
Code Editor
Run
EarSketch...
Opus1.py
IMPORT TO EDIT
#
#
# Setup Section
from earsketch import *
init()
setTempo(100)
# Music Section
fitMedia(Y01_DRUMS_1, 1, 1, 9)
fitMedia(Y11_BASS_1, 2, 1, 9)
fitMedia(Y11_GUITAR_1, 3, 1, 9)
# Finish Section
finish()
Script ran successfully.

THANK YOU