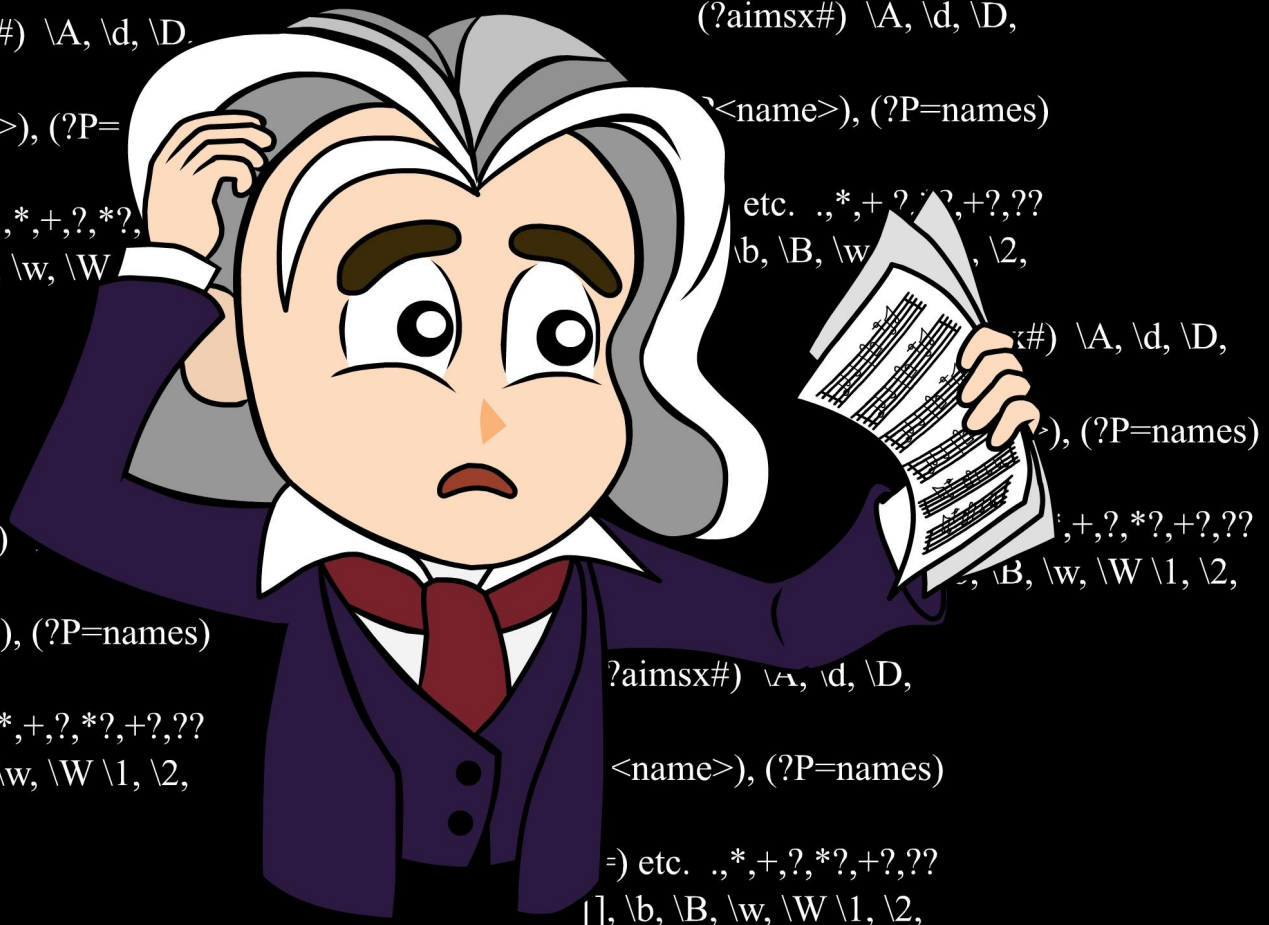
Learning Python Through Music: JythonMusic & Pyknon

Ria Baldevia | 2016 US PyCon | Portland, Oregon

(?aimsx#) \A, \d, \D,

(?P<name>), (?P=names)

(?=) etc. .,*,+,?,*?,+?,??
[], \b, \B, \w, \W \1, \2,

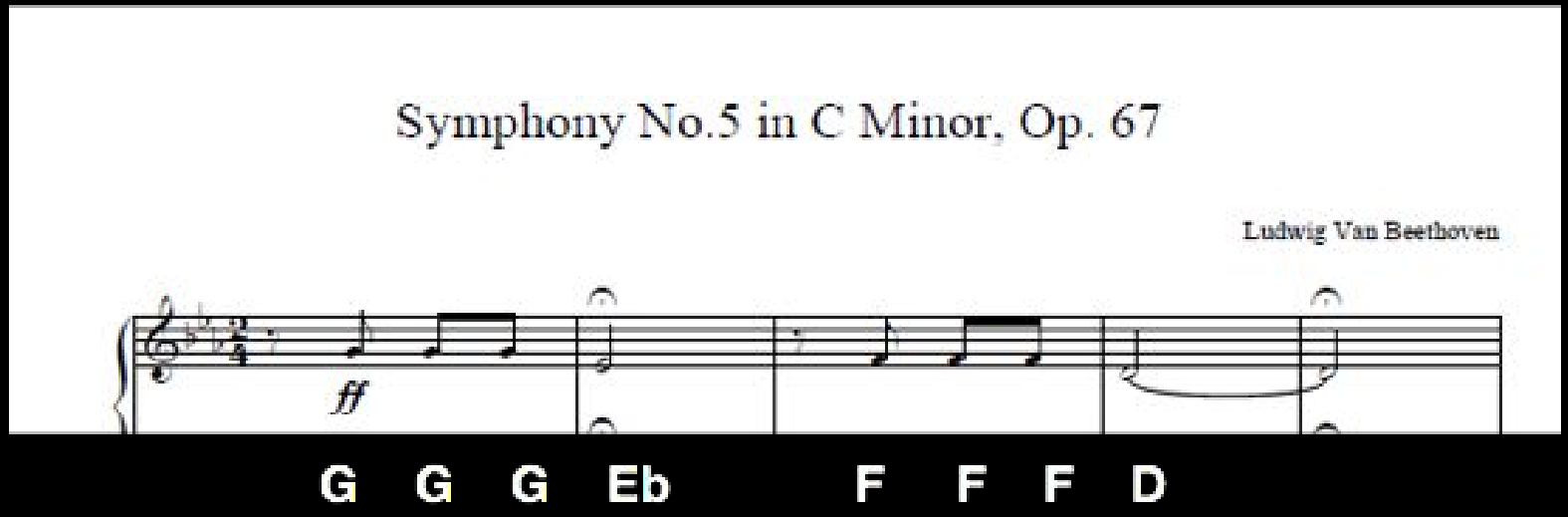


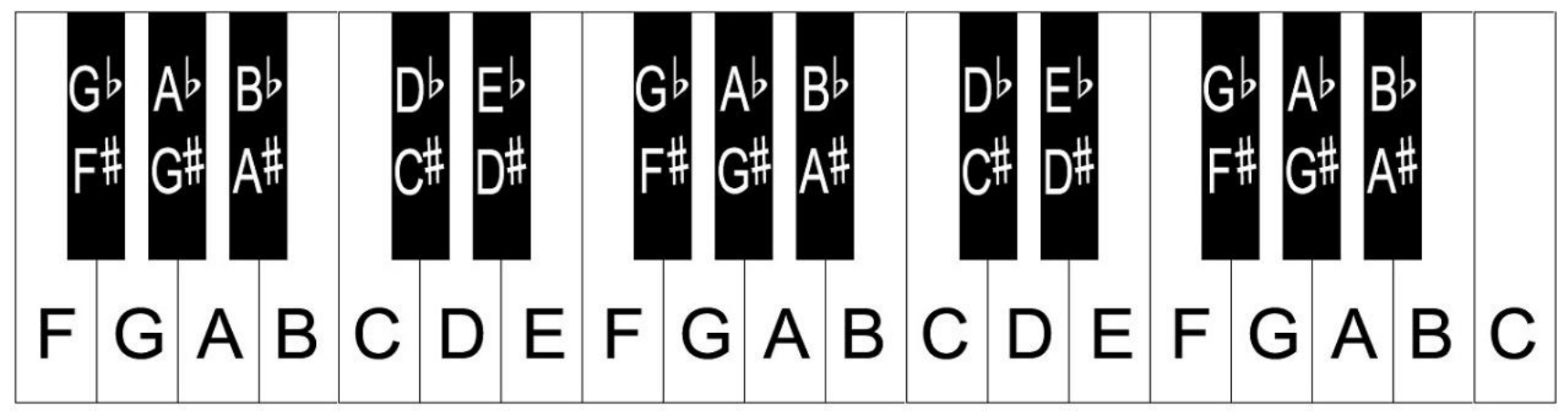
JythonMusic

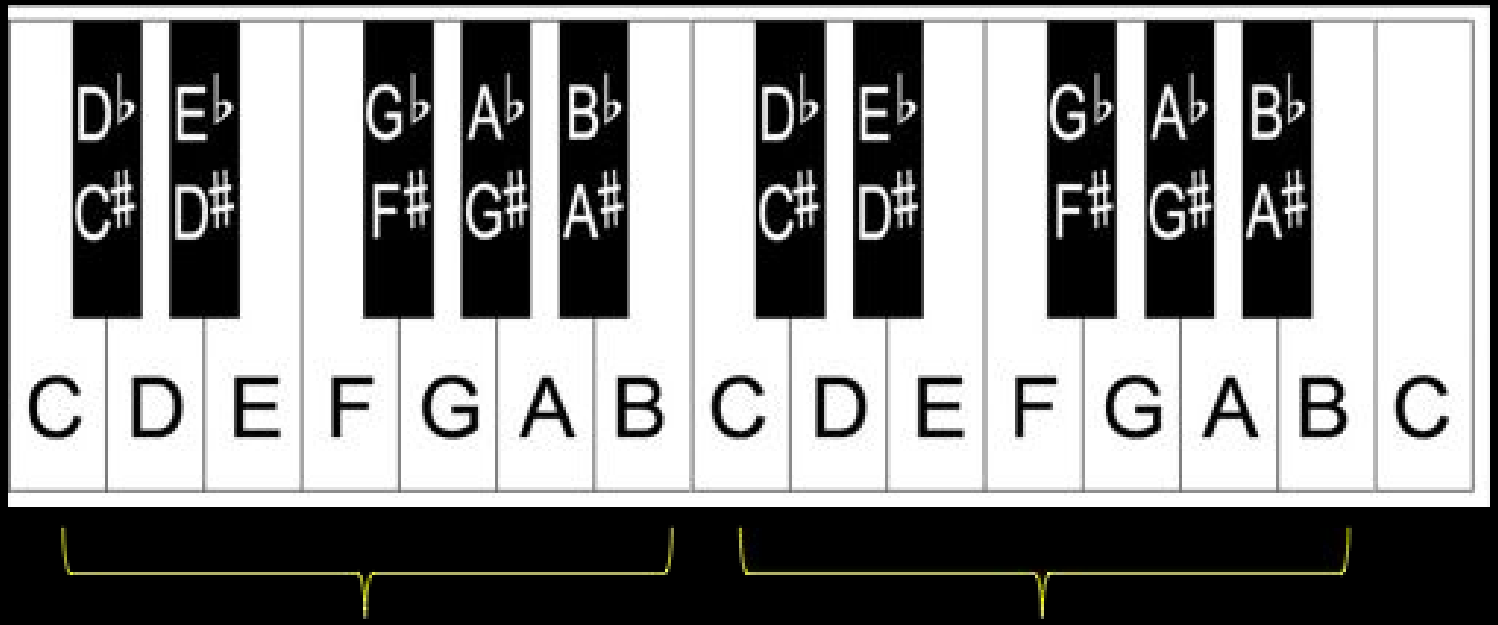
JythonMusic: Jython Environment for Music

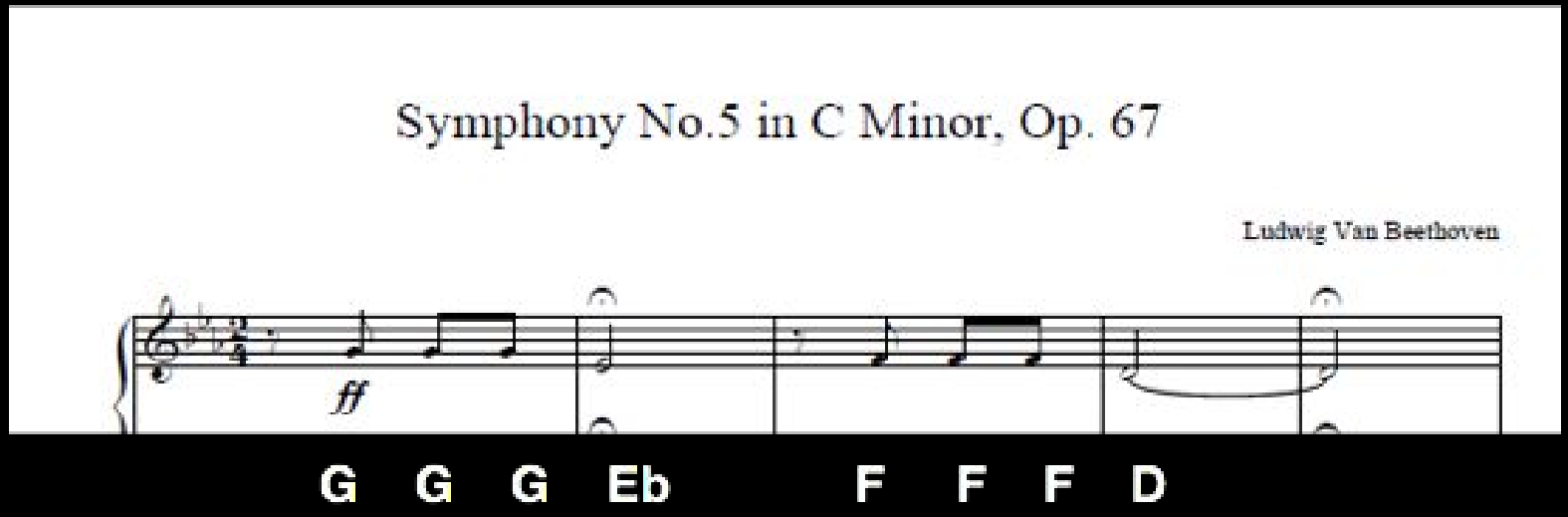
An open source environment conducive to creative programming. It is for programmers and musicians who want to explore music and coding.

Easy to download JEM via JythonMusic.org


Symphony No.5 in C Minor, Op. 67
Ludwig Van Beethoven
ff
G G G Eb F F F D


G♭ F♯
A♭ G♯
B♭ A♯
D♭ C♯
E♭ D♯
G♭ F♯
A♭ G♯
B♭ A♯
D♭ C♯
E♭ D♯
G♭ F♯
A♭ G♯
B♭ A♯
F G A B C D E F G A B C D E F G A B C


D♭
C♯
E♭
D♯
G♭
F♯
A♭
G♯
B♭
A♯
D♭
C♯
E♭
D♯
G♭
F♯
A♭
G♯
B♭
A♯
C D E F G A B C D E F G A B C
Octave 4
Octave 5


Symphony No.5 in C Minor, Op. 67
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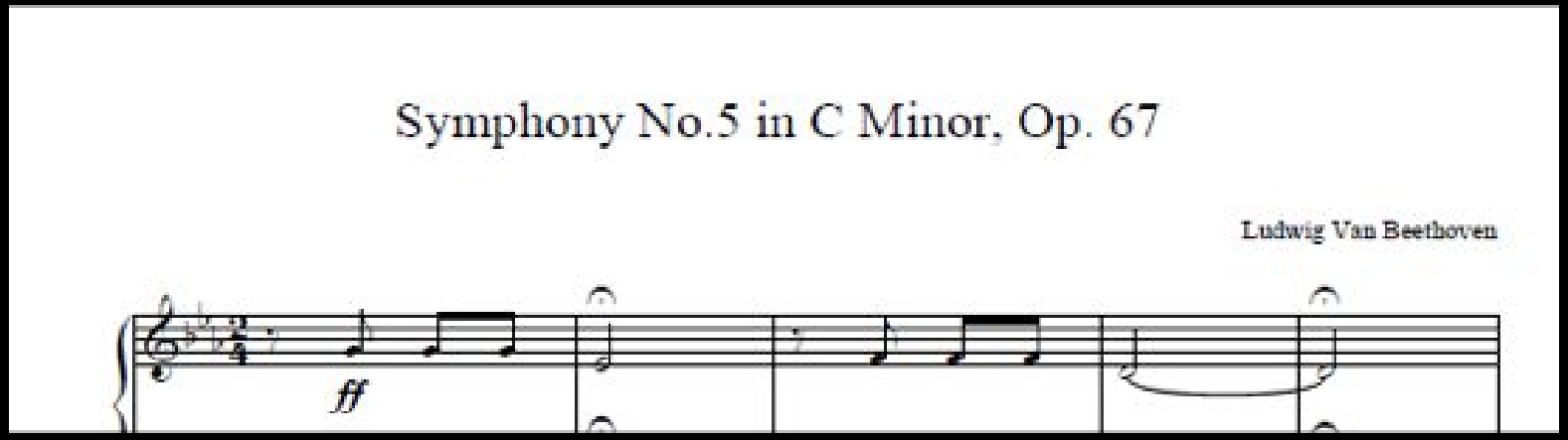
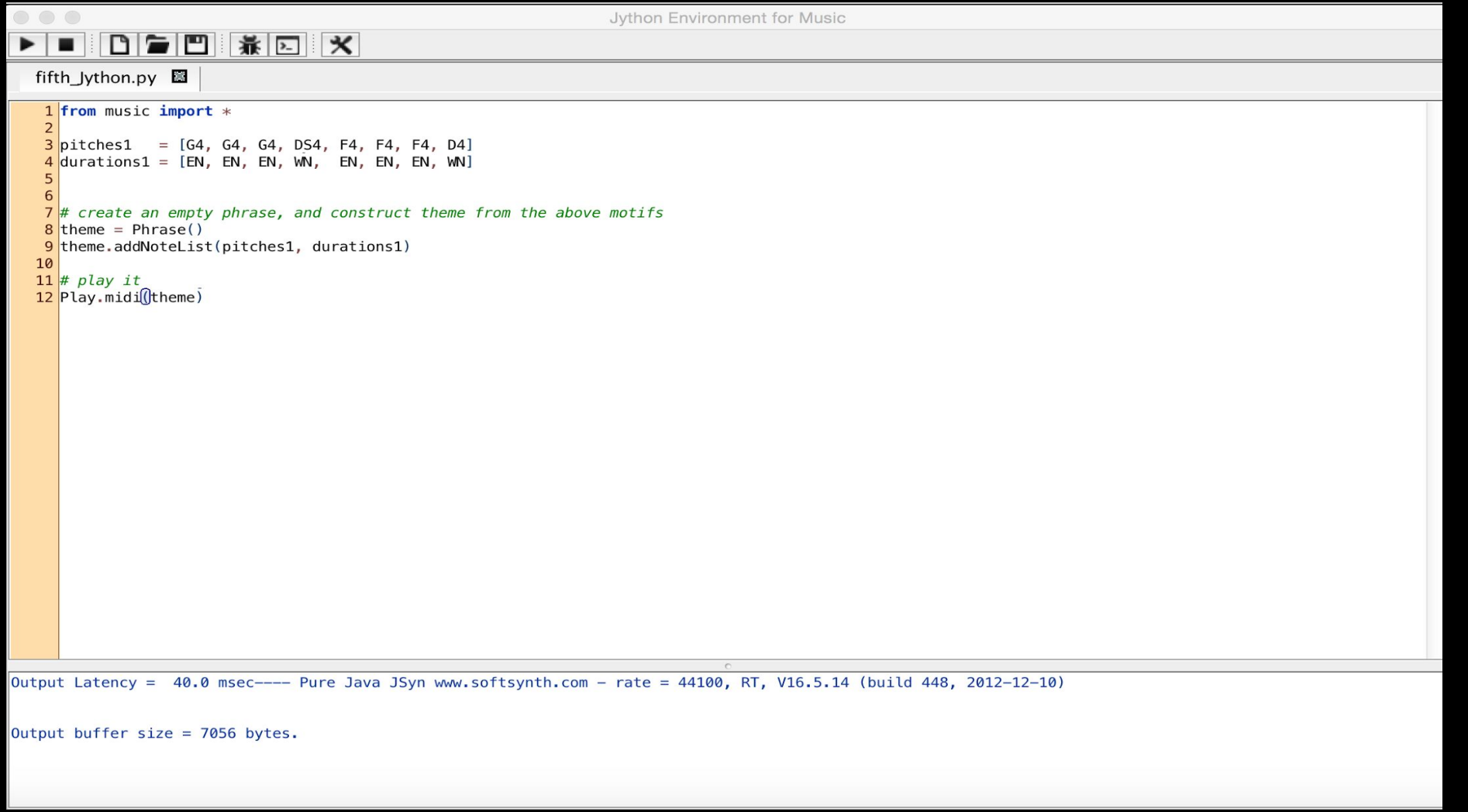


	G	**G**	**G**	**Eb**	**F**	**F**	**F**	**D**
Jython	G4	G4	G4	EF4/DS4	F4	F4	F4	D4


Jython Environment for Music
fifth_Jython.py
from music import *
pitches1 = [G4, G4, G4, DS4, F4, F4, F4, D4]
durations1 = [EN, EN, EN, WN, EN, EN, EN, WN]
# create an empty phrase, and construct theme from the above motifs
theme = Phrase()
theme.addNoteList(pitches1, durations1)
# play it
Play.midi(theme)
Output Latency = 40.0 msec---- Pure Java JSyn www.softsynth.com - rate = 44100, RT, V16.5.14 (build 448, 2012-12-10)
Output buffer size = 7056 bytes.

Jython Environment for Music

fifth_Jython.py | 6. autumnLeaves.py*

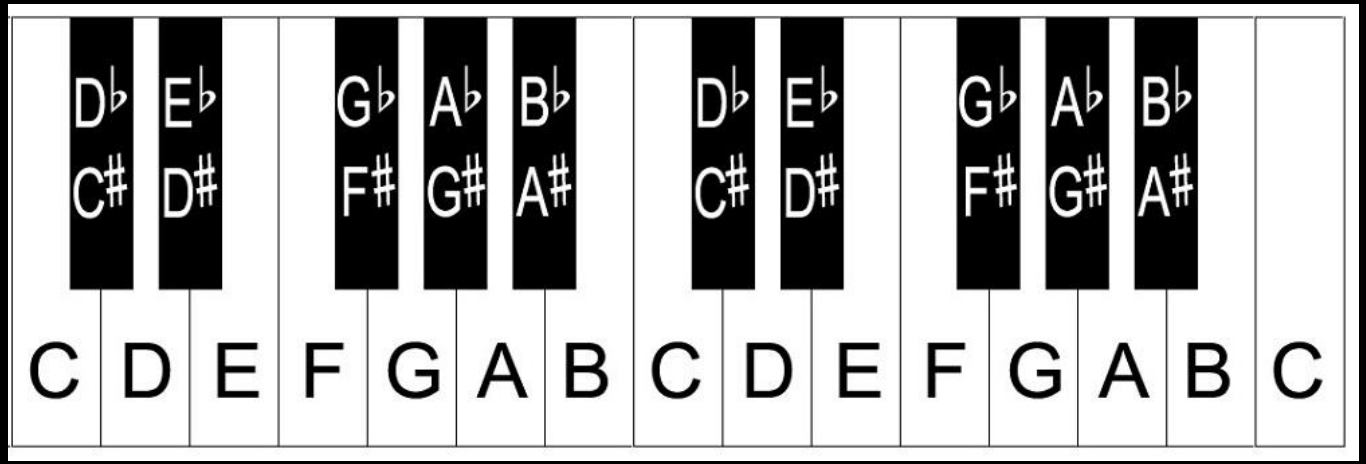
```
from music import *

##### define the data structure (score, parts, and phrases)
autumnLeavesScore = Score("Autumn Leaves (Jazz Trio)", 140) # 140 bpm

trumpetPart = Part(TRUMPET, 0)       # trumpet to MIDI channel 0
vibesPart  = Part(VIBES, 1)          # vibraphone to MIDI channel 1
bassPart    = Part(ACOUSTIC_BASS, 2) # bass to MIDI channel 2

melodyPhrase = Phrase()   # holds the melody
chordPhrase  = Phrase()   # holds the chords
bassPhrase   = Phrase()   # holds the bass line

##### create musical data
# melody
melodyPitch1 = [REST, E4, FS4, G4, C5, REST, D4, E4, FS4, B4,  B4]
melodyDur1   = [QN,   QN, QN,  QN, WN, EN,   DQN,QN, QN,  DQN, HN+EN]
melodyPitch2 = [REST, C4, D4, E4, A4, REST, B3, A4, G4, E4]
melodyDur2   = [QN,   QN, QN, QN, WN, EN,   DQN,QN, QN, WN+HN]

melodyPhrase.addNoteList(melodyPitch1, melodyDur1) # add to phrase
melodyPhrase.addNoteList(melodyPitch2, melodyDur2)

# chords
chordPitches1   = [REST, [E3, G3, A3, C4], [E3, G3, A3, C4], REST,
                   [FS3, A3, C4]]
chordDurations1 = [WN,    HN,              QN,             QN,
                   QN]
chordPitches2   = [REST, [D3, FS3, G3, B3], [D3, FS3, G3, B3]]
chordDurations2 = [DHN,  HN,                QN]
chordPitches3   = [REST, [C3, E3, G3, B3], REST, [E3, FS3, A3, C4],
                   [E3, FS3, A3, C4]]
chordDurations3 = [QN,   QN,              DHN,  HN,
                   QN]
chordPitches4   = [REST, [DS3, FS3, A3, B3], REST, [E3, G3, B3],
                   [DS3, FS3, A3, B3]]
chordDurations4 = [QN,   QN,                DHN,  HN,
                   QN]
chordPitches5   = [REST, [E3, G3, B3], REST]
chordDurations5 = [QN,   HN,           HN]
```

```
Output Latency =  40.0 msec---- Pure Java JSyn www.softsynth.com - rate = 44100, RT, V16.5.14 (build 448, 2012-12-10)
```

Pyknon

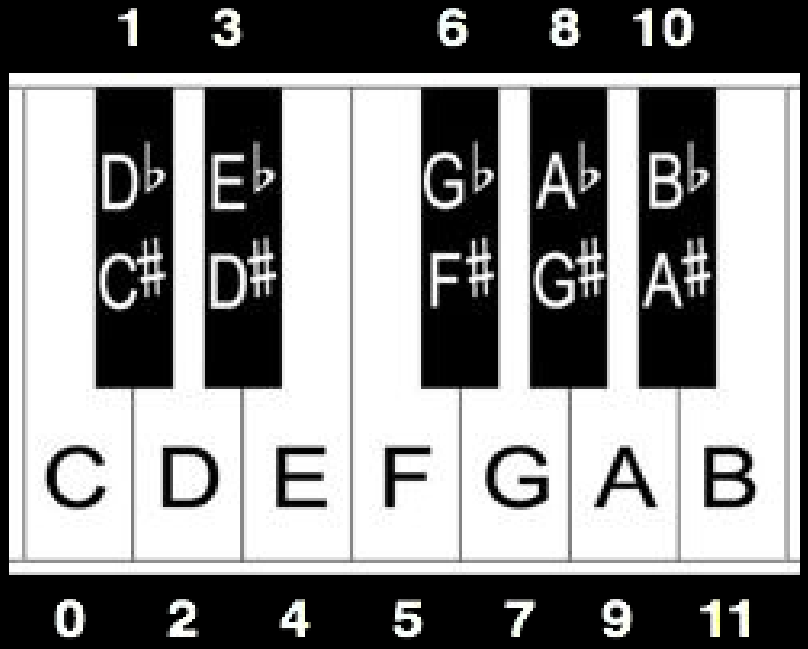
By Pedro Kroger

Book: Music for Geeks & Nerds


D♭ C♯
E♭ D♯
G♭ F♯
A♭ G♯
B♭ A♯
D♭ C♯
E♭ D♯
G♭ F♯
A♭ G♯
B♭ A♯
C D E F G A B C D E F G A B C


D♭ C♯
E♭ D♯
G♭ F♯
A♭ G♯
B♭ A♯
D♭ C♯
E♭ D♯
G♭ F♯
A♭ G♯
B♭ A♯
C D E F G A B C D E F G A B C
Octave 4
Octave 5

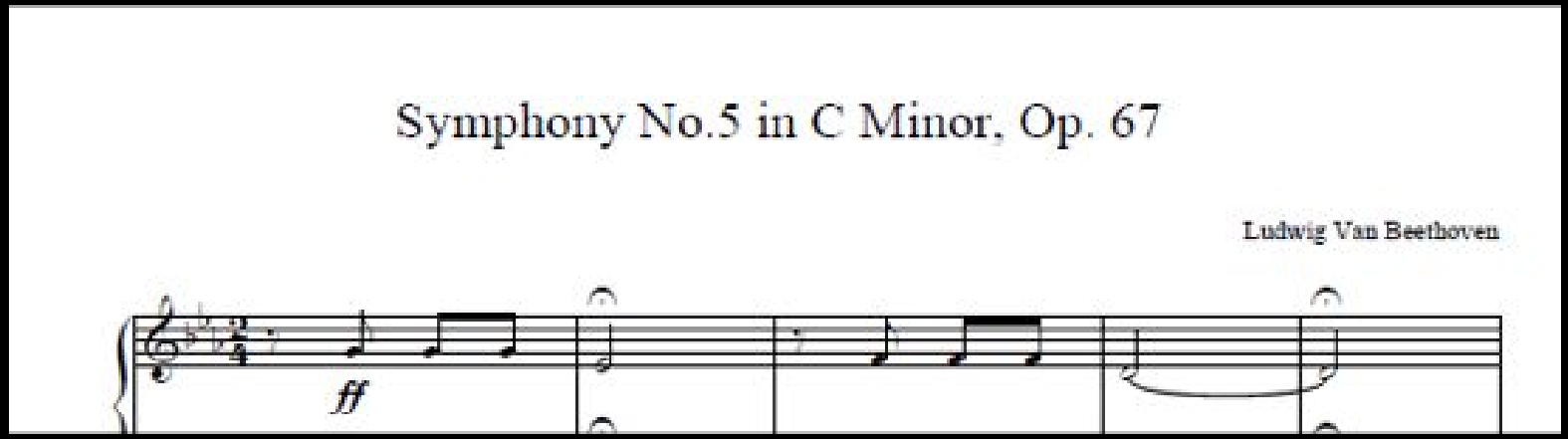
```
>>> from pyknon.music import Note
>>> def mod12(n):
...     return n % 12
...
>>> def note_name(number):
...     notes = "C C# D D# E F F# G G# A A# B".split()
...     return notes[mod12(number)]

>>> note_name(5)
'F'
>>> note_name(0)
'C'
>>> note_name(60)
'C'
```


1 3 6 8 10
D♭ E♭ G♭ A♭ B♭
C♯ D♯ F♯ G♯ A♯
C D E F G A B
0 2 4 5 7 9 11

```
>>> from pyknon.music import Note
>>> from pyknon.music import NoteSeq
>>> a = Note()
>>> a
<C>
>>> a.octave
5
>>> a.value
0
>>> a.volume
100
>>> a.dur
0.25
>>> a.midi_number
60
>>> a = Note(3)
>>> a
<D#>
>>> a.octave
5
>>> a.volume
100
>>> a.value
3
>>> a.dur
0.25
>>> a.midi_number
63
```

```
>>> from pyknon.music import NoteSeq
>>> from pyknon.music import Note
>>> NoteSeq([Note(0), Rest(1), Note("C#8")])
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
NameError: name 'Rest' is not defined
>>> from pyknon.music import Rest
>>> NoteSeq([Note(0), Rest(1), Note("C#8")])
<Seq: [<C>, <R: 1>, <C#>]>
>>> NoteSeq("C R C#8")
<Seq: [<C>, <R: 0.25>, <C#>]>
>>> NoteSeq("C#2 D#")
<Seq: [<C#>, <D#>]>
>>> NoteSeq("C# D#")
<Seq: [<C#>, <D#>]>
>>> NoteSeq([Note(0), Note(2)])
<Seq: [<C>, <D>]>
>>> NoteSeq("G G Eb")
<Seq: [<G>, <G>, <D#>]>
>>> NoteSeq("F F F D")
<Seq: [<F>, <F>, <F>, <D>]>
```

```
>>> from pyknon.music import Note
>>> from pyknon.music import NoteSeq
>>> c = Note("C")
>>> c
<C>
>>> c_major_scale = NoteSeq("C D E F G A B")
>>> c_major_scale
<Seq: [<C>, <D>, <E>, <F>, <G>, <A>, <B>]>
>>> c.harmonize(c_major_scale)
[<C>, <E>, <G>]
>>> d = Note("D")
>>> d
<D>
>>> d_major_scale = NoteSeq("D E F# G A B C#)
  File "<stdin>", line 1
    d_major_scale = NoteSeq("D E F# G A B C#)
                                           ^
SyntaxError: EOL while scanning string literal
>>> d_major_scale = NoteSeq("D E F# G A B C#")
>>> d_major_scale
<Seq: [<D>, <E>, <F#>, <G>, <A>, <B>, <C#>]>
>>> d.harmonize(d_major_scale)
[<D>, <F#>, <A>]
>>> d_major_scale.harmonize(size=4)
[<Seq: [<D>, <F#>, <A>, <C#>]>, <Seq: [<E>, <G>, <B>, <D>]>, <Seq: [<F#>, <A>, <C#>, <E>]>, <Seq: [<G>, <B>, <D>, <F#>]>, <Seq:
[<A>, <C#>, <E>, <G>]>, <Seq: [<B>, <D>, <F#>, <A>]>, <Seq: [<C#>, <E>, <G>, <B>]>]
```



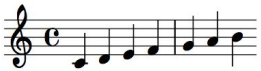
	G	**G**	**G**	**Eb**	**F**	**F**	**F**	**D**
Jython	G4	G4	G4	EF4/DS4	F4	F4	F4	D4
Pyknon	7 G5	7 G5	7 G5	3 D#5	5 F5	5 F5	5 F5	2 D5

```
>>> from pyknon.genmidi import Midi
>>> from pyknon.music import NoteSeq
>>> from pyknon.music import Note
>>> notes1=NoteSeq([Note(7, dur=.25), Note(7, dur=.25), Note(7, dur=.25), Note(3, dur=1),
Note(5, dur=.25), Note(5, dur=.25), Note(5, dur=.25), Note(2, dur=1)])
>>> midi = Midi(number_tracks=1, tempo=108)
>>> midi.seq_notes(notes1, track=0)
14.0
>>> midi.write("fifth10.mid")
```

LilyBin Preview Stable Reset Save to Undo Redo Open

```
% LilyBin
\score{
    {
        c'd'e'f'g'a'b'
    }

    \layout{}
    \midi{
       \tempo 4 = 108}

}
```

Page: 1 of 1 Automatic Zoom



...

	Jython	Pyknon	Others
Center of the Keyboard	Octave 4	Octave 5	.ly ‘
Environment	JEM	Can code from Command Line	EarSketch: application
Difficulty	Beginners	Beginners-Advanced