

Sonic Pi Generative Music Unit Plan

Lesson # 3 - Manipulating Data Structures

Lesson Objectives

Students will be able to use ring chain methods to change the size and values selected from data structures.

Suggested Duration

1 period (45 minutes)

NYS Computer Science and Digital Fluency Learning Standards

7-8.CT.1 *Compare the results of alternative models or simulations to determine and evaluate how the input data and assumptions change the results.*

Assessments

- Assess _____. Check for the ability to:
 - Use built in methods to select values from data structures
 - Use functions which return random values to select a random number of values from a data structure

Do Now

Students should complete **Selecting Random Sequences** worksheet

Lesson

Part 1 - Ring chain methods

1. After completing the worksheet, explain to students that each set of directions they did in the worksheet represent a method that can be applied to a sequence of numbers that is stored inside of a ring (a data structure specific to Sonic PI)
2. Provide the list of these methods to students.

- `.drop(n)`
- `.take_last(n)`
- `pick(n)`
- `.shuffle`
- `.take(n)`
- `.reverse`
- `.drop_last(n)`

3. Working in pairs, have students predict which method goes with which set of directions.

They should write the method on the specified line of the worksheet.

Part 2 - Code examples in Sonic Pi

1. Demonstrate all methods in Sonic Pi by printing the results on each method in the console.
2. When getting to responses that require students to choose a number between 1 and 6, have a student provide a chosen number for the first example.

When moving on to the next examples, ask if students can think of a way that they could have Sonic Pi choose that number for them

Possible response: `dice`, `rand_i`

Demonstrate each one

Code Examples

```

1
2 # Original sequence
3 seq = (ring, 50, 52, 54, 55, 57, 59, 61, 62)
4
5 # store shuffled sequence in new variable
6 seqShuffled = seq.shuffle
7
8 # print new shuffled sequence
9 puts seqShuffled
10
11 # print reversed shuffled sequence
12 puts seqShuffled.reverse
13
14 # print first 4 numbers from shuffled sequence
15 puts seqShuffled.take(4)
16
17 # remove btwn 1-6 numbers from beginnning
18 puts seqShuffled.drop(dice)
19
20 # pick btwn 1-6 random numbers from sequence
21 puts seqShuffled.pick(rand_i(1, 6))
22
23 # remove btwn 1-6 numbers from end
24 puts seqShuffled.drop_last(3)
25
26 # take last 2 numbers from sequence
27 puts seqShuffled.take_last(2)
28

```

Console Output

```

=> Starting run 3

{run: 3, time: 0.0}
├ (ring 52, 50, 61, 55, 59, 62, 54, 57)
├ (ring 57, 54, 62, 59, 55, 61, 50, 52)
├ (ring 52, 50, 61, 55)
├ (ring 62, 54, 57)
├ (ring 50, 52, 59)
├ (ring 52, 50, 61, 55, 59)
└ (ring 54, 57)

```

3. Call attention to the fact that the original sequence of notes is actually a major scale

Replace original sequence ring with scale function - `scale(50, :major)` and show that the results will be the same

```
2 # Original sequence
3 seq = scale(50, :major)
```

Wrap Up/Assessment

Have students check their predictions of which methods go with which set of directions from the worksheet.

Students can choose remaining time to experiment with ring chain methods in Sonic Pi.

Challenge students to try and play through the notes in the rings. Consider issues that arise. Explain that these issues will be addressed in the next class.

Selecting Random Sequences worksheet

Original Number Sequence: 50, 52, 54, 55, 57, 59, 61, 62

Step 1: Rearrange the original number sequence. This will be your new number sequence that you will refer to in order to complete the following responses.

Ring method _____

Step 2: Complete the following responses using your new sequence each time.

DO NOT fill in the Ring method line yet.

1. Write your new sequence in reverse

| |
|--|
| |
|--|

Ring method _____

2. Choose a number between 1 and 6.

Take that many numbers from the front of the new sequence

| |
|--|
| |
|--|

Ring method _____

3. Choose a number between 1 and 6.

Take that many numbers from the back of the new sequence

Ring method_____

4. Choose a number between 1 and 6.

Randomly choose that many numbers from the new sequence

Ring method_____

5. Choose a number between 1 and 6.

Remove that number of numbers from the end of the new sequence.

Write down the remaining number in the sequence

Ring method_____

6. Choose a number between 1 and 6.

Remove that number of numbers from the beginning of the new sequence.

Write down the remaining number in the sequence

Ring method_____