

2019

Isharine: Python Code Examples

Matthew Sokolovsky
Pace University

Follow this and additional works at: https://digitalcommons.pace.edu/honorscollege_theses



Part of the [Computer Sciences Commons](#)

Recommended Citation

Sokolovsky, Matthew, "Isharine: Python Code Examples" (2019). *Honors College Theses*. 251.
https://digitalcommons.pace.edu/honorscollege_theses/251

This Thesis is brought to you for free and open access by the Pforzheimer Honors College at DigitalCommons@Pace. It has been accepted for inclusion in Honors College Theses by an authorized administrator of DigitalCommons@Pace. For more information, please contact nmcguire@pace.edu.

Matthew Sokolovsky

Isharine

Python Code Examples

Major: Computer Science
Advisor: Christelle Scharff
Department: Seidenberg
Presenting: May 2019
Graduating: May 2019

Abstract

In order to create a computer program, one must write code in a programming language. My interest is in the teaching of these languages. Although programming languages are much simpler and easier to learn than normal human languages, they have extremely strict rules. Even a single typo can crash the entire program. Every programming language has basic features - keywords, syntax - that programmers new to the language cannot simply guess. To learn these features (or remember them), one has to either take a course on the language or look up examples of the features.

For my Honors thesis, I am creating a website, [Isharine Code \(https://isharine.com\)](https://isharine.com), that lists many code examples in a single programming language: Python. The purpose of these code examples is not to show how to do common programming problems in the language, but to show all the basic features of the language.

Table of Contents

Introduction	5
Similar Websites	6-8
Technology	8-9
Process	9-11
The Isharine System	12-16
Future work	17
References	18

Introduction

Isharine Code is just one of many code example websites already on the Internet.

However, these websites tend to be unsophisticated. Ichinco (2018) found:

Current example code suggestions do not typically enable users to tinker with or explore examples without inserting them into the user's code. Some allow execution of the entire code snippet, along with a visualization of the entire code snippet output, but do not allow changes or selecting a specific part of the code to execute. When watching the execution of a whole code snippet, it might be hard, especially for a novice, to determine which elements of code have which effect. Enabling a user to tinker with an example without inputting it into their code might enable them to better understand each element of a code example before they try to implement it themselves. This could prevent novices from creating new errors when using new code.¹

Isharine Code has all of the features recommended here. Users can run the code examples directly on the website, change the code, and run parts of the code.

Isharine Code is best used as a reference while the user is working with Python somewhere else, either for school or on a website such as HackerRank, in which users solve programming challenges. Since Isharine Code lists the basic features of Python rather than outright solutions to common programming problems, it can assist users without giving them the answers. Isharine Code likely will not be sufficient to teach the user Python by itself.

Isharine Code is intended for users with at least some experience at programming, such as students who have previously learned another programming language. Since the website is composed almost entirely of examples, with few comments or explanations, a user who does not have at least a minor understanding of programming concepts might have great difficulty understanding the code examples.

¹ (Ichinco, 2018)

Similar Websites

To get a better idea of the quality of other code example websites, I did research examining some of them. I made a checklist of useful features for a code example website that make the code on the website easier to understand:

- Does the website highlight keywords and other pieces of code that have special meanings in the programming language?
- Can the user run the code examples on the website in order to see what they do (or can the user at least see the output of the code)?
- Can the user modify the code examples on the website?
- Can the user run specific parts of code examples to see what those parts do?

My process of choosing websites to research had two steps. First, I selected specific websites I knew were either popular or notable that had substantial lists of Python code examples. These were tutorialspoint.com (a major website with tutorials on many aspects of computer science), w3schools.com (a major website with tutorials on Python and several other programming languages), and docs.python.org (the official online manual for Python). My basis for considering tutorialspoint.com and w3schools.com “popular websites” comes from their Alexa rank. The website Alexa ranks websites by how frequently they are visited and how much time viewers spend on them. As of 4/22/19, w3schools.com was ranked the 150th most popular website in the world,² and tutorialspoint.com was ranked 444th.³

Second, I did a Google search for “python code examples” and examined every website that appeared on the first page.

² (Alexa, 4/22/19)

³ (Alexa, 4/22/19)

Here were the results:

Website	Syntax highlighting?	Can code examples be run (or can we at least see the output)?	Can code examples be modified?	Can parts of code examples be run?
isharine.com	Yes	Yes	Yes	Yes
tutorialspoint.com	Yes	Yes	Yes	No
w3schools.com	Yes	Yes	Yes	No
docs.python.org	Yes	No	No	No
pythonforbeginners.com	Yes	Yes	No	No
geeksforgeeks.org	Yes	Yes	No	No
sanfoundry.com	Yes	Yes	No	No
programiz.com	Yes	Yes	Yes	No
sandbox.mc.edu/~benet/python/code/	No	No	No	No
learnpython.org	Yes	Yes	Yes	No
makeuseof.com/tag/basic-python-examples-learn-fast/	Yes	No	No	No
github.com/geekcomputers/Python	Yes	No	No	No
wiki.python.org/moin/SimplePrograms	No	No	No	No
pythoncentral.io	Yes	Yes	No	No

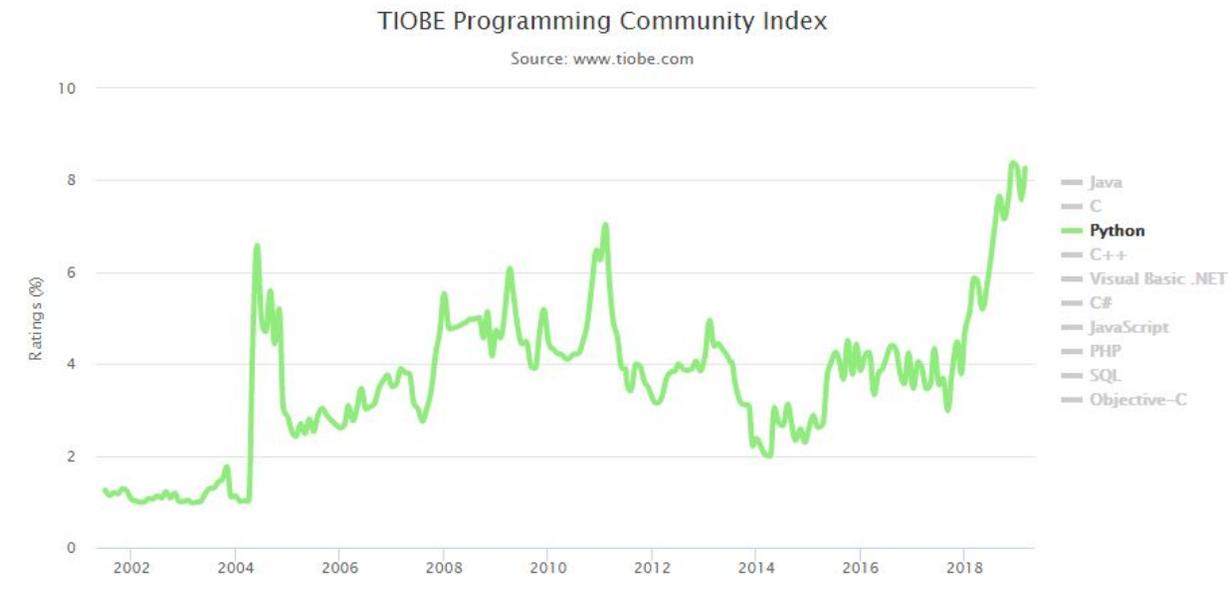
According to my research, code example websites tend to lack one or more of the useful features that Isharine Code has. That is not to say that my website is superior to all of these; Tutorialspoint, W3Schools, and several of the other sites I examined have plenty of other features Isharine Code does not have, such as code examples from languages other than Python. And of course, some of those sites are barely any more professional than my own website. But it is at least notable that my website has a useful feature - letting the user run parts of the code - that even some major code example websites do not have.

Technology

I put Isharine Code on the Internet by having it hosted on a site called GitHub Pages. Had I not done that, I would have to host the website myself, using one of my own computers as a server. The problem with that option is that the Internet speed in my house is very slow (less than 1 Mbps at its fastest), so the website would be very slow for anyone who accessed it. Opening my computer to the Internet could also pose major security risks, especially since I am giving hackers a place to run code.

Using GitHub Pages has its own problems, however. Because GitHub Pages does not let me put files on the server hosting the website, the code for the website must be entirely client-side. This prevents Isharine from compiling code in most languages. The only programming language for which I could find an entirely client-side implementation is Python. That is why Isharine is currently Python-only. Limiting the scope of this project to just one language also makes it more feasible to complete in the timeframe of this thesis project.

Python also happens to be a good choice; according to the TIOBE index, which measures the popularity of programming languages, Python's popularity has soared in the past few years.



4

Isharine runs Python code using a script which I obtained from skulpt.org, a website whose primary purpose is to share this particular script.

Isharine also uses another module called CodeMirror, downloaded from codemirror.net. CodeMirror lets the website have better text fields for putting code examples. Because of CodeMirror, the code on Isharine has syntax highlighting and line numbers.

Process

In my work on Isharine Code, I attempted to follow a rigorous process of software development known as Scrum. Early on in this process, I had to create a Product Backlog, a Google Sheets file listing the features the website should have (functional requirements) as well

⁴ (TIOBE, 2019)

as the constraints the website design must follow (non-functional requirements). For each feature, I had to explicitly state what the feature was, what kinds of users would want such a feature, and why they would want it.

Matthew Sokolovsky - Product Backlog for Isharine

File Edit View Insert Format Data Tools Add-ons Help Last edit was 13 days ago

Product Backlog

ID	Name	Creation Date	Requirement Type	Description	Size	Priority	Dependencies	Notes	Sprint
US1	Create all Python code examples for website	3/3/2019	Functional	As a programmer who is learning or re-learning basic Python programming I want to see examples showing the basic features of Python so I can learn to use those features.	Large	Must have	I need to do more research on Python programming.	This will be a lot of work, but it will at least be reasonably straightforward. My plan is to write code examples showing how to use every keyword and built-in function that doesn't require the user to import an external library like Matplotlib (external libraries cannot be used on this website because I would have to put the entire library on the GitHub repository for this website).	1, 2
US2	Implement syntax highlighting	3/3/2019	Functional	As a programmer who is learning or re-learning basic programming I want code on the website to have highlighting so I can see whether a piece of code has a special meaning.	Large	Should have	I need to research how to implement this.	One way I could implement	3

In total, I identified 11 requirements to implement (the picture above shows the first two).

Following Scrum, I divided my time working on the project into several Sprints. For this project, I did three Sprints, each two weeks long.

- Sprint 1: 3/11/19 - 3/25/19
- Sprint 2: 3/25/19 - 4/8/19
- Sprint 3: 4/8/19 - 4/22/19

At the beginning of each Sprint, I had to choose some of the tasks from the Product Backlog to put in another backlog for that Sprint. During the Sprint, I would only work on implementing requirements I had put in the current Sprint Backlog.

Every day during the Sprint that I am doing work on this project, I must do a Scrum. This requires me to answer three questions:

1. What have I accomplished since the previous Scrum?
2. What will I do before the next Scrum?
3. What obstacles are impeding my progress?

For example:

Sprint 2

Scrum 1 (3/30/19):

What have I accomplished since the previous Scrum?

This is the first day I am doing work on this sprint.

What will I accomplish before the next Scrum?

I will implement the rest of the code examples.

What obstacles are in the way?

I need to stay focused on the task and not go off on a tangent doing something else that's irrelevant.

Scrum 2 (4/6/19)

What have I accomplished since the previous Scrum?

I finished writing Python code examples for the website.

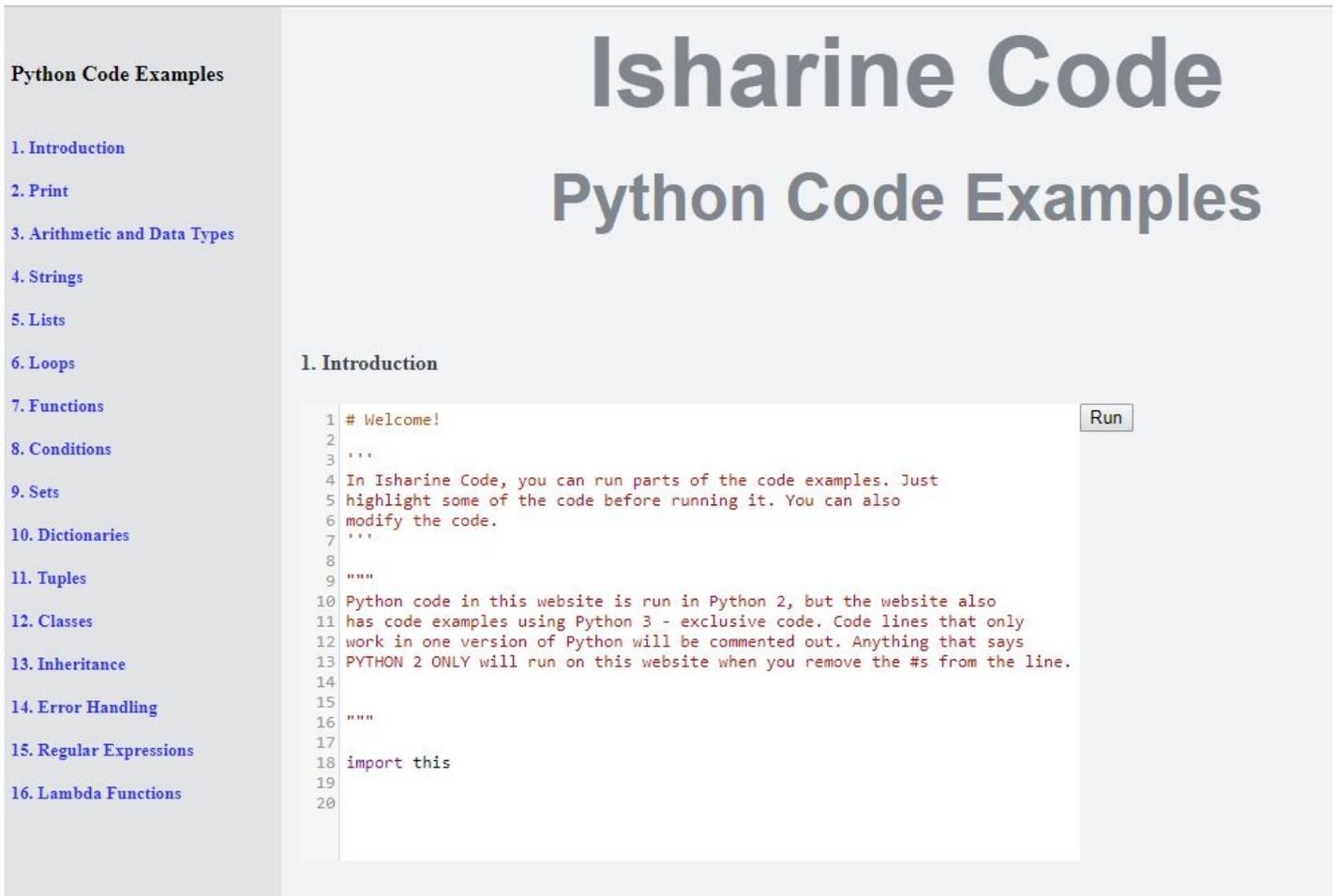
What will I accomplish before the next Scrum?

The website will show a list of the code sections of the website. The user will be able to click on one of the links in the list to go to one of the code sections. The list could be at the top of the screen and would follow as the user scrolled up or down.

What obstacles are in the way?

I need to research how to make a webpage element that stays in place when the

The Isharine System



Python Code Examples

- 1. Introduction
- 2. Print
- 3. Arithmetic and Data Types
- 4. Strings
- 5. Lists
- 6. Loops
- 7. Functions
- 8. Conditions
- 9. Sets
- 10. Dictionaries
- 11. Tuples
- 12. Classes
- 13. Inheritance
- 14. Error Handling
- 15. Regular Expressions
- 16. Lambda Functions

Isharine Code

Python Code Examples

1. Introduction

```
1 # Welcome!
2
3 '''
4 In Isharine Code, you can run parts of the code examples. Just
5 highlight some of the code before running it. You can also
6 modify the code.
7 '''
8
9 """
10 Python code in this website is run in Python 2, but the website also
11 has code examples using Python 3 - exclusive code. Code lines that only
12 work in one version of Python will be commented out. Anything that says
13 PYTHON 2 ONLY will run on this website when you remove the #s from the line.
14
15
16 """
17
18 import this
19
20
```

Run

Isharine Code has sixteen Python code example sections. The sections are organized by the features of Python they demonstrate. Each section contains not so much a program as a sequence of commands, with each command showing something different that can be done in Python.

The code in each section can be run by pressing the button next to the code. The output of the code appears on the right.

2. Print

```
1
2 print('Naroosh')
3
4 print("")
5
6 print("Naroosh")
7 #print "Naroosh" # PYTHON 2 ONLY
8
9 #print ("Nerash", end = " ") # PYTHON 3 ONLY
10 print ("Noraash", "Nireshe")
11
12 print("")
13
14 print ("\tNora\ash\n \Nireshe")
15
```

Run

Naroosh

Naroosh
('Noraash', 'Nireshe')

Nora\ash
"Nireshe"

The user can also edit the code to try new things out, and can run the new code.

2. Print

```
1
2 print('Vendweeblee')
3
4 print("")
5
6 the_name = "Naroo"
7
8 print(the_name)
9 print the_name
10
11
```

Run

Vendweeblee

Naroo
Naroo

The user can also run a specific part of the code by selecting it before pressing the button.

This allows the user to more easily tell what a specific part of the code does.



The screenshot shows a code editor window titled "2. Print". The code is as follows:

```
1
2 print('Vendweeblee')
3
4 print("")
5
6 the_name = "Naroo"
7
8 print(the_name)
9 print the_name
10
11
```

Line 6, `the_name = "Naroo"`, is highlighted in grey. To the right of the code editor is a "Run" button. Below the button, the output "Naroo" is displayed.

On the left of the screen, there is a list of the code sections. The user can click on one of the links in the list to jump straight to the section they're looking for.

The image shows a Python code editor interface. On the left side, there is a vertical sidebar titled "Python Code Examples" containing a list of 16 numbered links. The link for "7. Functions" is highlighted in red. The main area of the editor is divided into two sections. The top section is titled "7. Functions" and contains a code snippet with a "Run" button to its right. The code defines a function to add 2 to each element of a list, a list of numbers, and a function to get the three highest values from a list. The bottom section is titled "8. Conditions" and contains a code snippet with a "Run" button to its right. The code defines a function that returns different strings based on the input value and then prints the results for values 0 through 8.

Python Code Examples

- 1. Introduction
- 2. Print
- 3. Arithmetic and Data Types
- 4. Strings
- 5. Lists
- 7. Functions**
- 8. Conditions
- 9. Sets
- 10. Dictionaries
- 11. Tuples
- 12. Classes
- 13. Inheritance
- 14. Error Handling
- 15. Regular Expressions
- 16. Lambda Functions

7. Functions

```
1 def add_two_to_list(thelistthing):
2     for i in range(len(thelistthing)):
3         thelistthing[i] += 2
4
5 nums = [2, 1, 3, 4, 5, 6, 7, 9, 8]
6
7 add_two_to_list(nums)
8 print(nums)
9
10 #print(get_three_higher(20)) # CAUSES AN ERROR
11 def get_three_higher(efala = 1):
12     efala += 3
13     return efala
14
15 print(get_three_higher(20))
16 print(get_three_higher())
17
```

8. Conditions

```
1 def vakren(qua):
2     if qua > 4:
3         return("Yiffer")
4     elif (qua == 3):
5         return("Nuffer")
6     else:
7         return("Leffer")
8 for i in range(9):
9     print(vakren(i))
10
```

Future Work

One major extension of Isharine Code would be to include code examples for programming languages other than Python. If I were to do this, I would start with examples for Java, C, and C++, because those are the other 3 languages currently in the top 4 of the TIOBE Index,⁵ and I have some experience with each of those. I have no plans to implement this during my work on my Honors Thesis, but I could potentially work on it after I graduate.

⁵ (TIOBE, 2019)

References

Alexa (4/22/19). Tutorialspoint.com Traffic, Demographics and Competitors. Retrieved from <https://www.alexa.com/siteinfo/tutorialspoint.com>

Alexa (4/22/19). W3schools.com Traffic, Demographics and Competitors. Retrieved from <https://www.alexa.com/siteinfo/w3schools.com>

Ichinco, M. (2018). A Vision for Interactive Suggested Examples for Novice Programmers. *2018 IEEE Symposium on Visual Languages and Human-Centric Computing*. Retrieved from <https://ieeexplore-ieee-org.rlib.pace.edu/stamp/stamp.jsp?tp=&arnumber=8506535>

TIOBE. (2019). TIOBE Index. Retrieved from <https://www.tiobe.com/tiobe-index/>