Python Beginner's Workshop

In Collaboration with the Pikes Peak Library District 21st
Century Library

Ryan E. Freckleton

PySprings

2018-03-15



Outline

- Introduction
- First Steps
 - Running Python
 - Expressions
- Data Types
 - Data Type
 - Strings
 - Lists
 - Dictionaries
- Libraries
 - Environments
 - ► Third-Party Packages
- Control Flow
 - Booleans
 - Looping and Branching



Conduct

- ▶ Treat everyone with the respect due their inherent dignity.
- ► All communication should be appropriate for a professional audience including people of many different backgrounds.
- ▶ Be kind to others. Make an environment conducive to learning. Behave professionally.
- ► Thank you for helping make this a welcoming, friendly event for all.
- Contact the organizers at pysprings@pysprings.org or https://sayat.me/pysprings (anonymous)
- pysprings@pysprings.org



Libraries

Data Types

Greetings

- 1. Your name
- 2. How did you get here?

First Steps



First Steps

Learning Goals

1-2-4-AII

Introduction

•000

- ▶ What's one thing you know about programming in Python?
- ► What's one thing that you'd like to learn about programming in Python?



Libraries

Introduction Short lecture introducing a new concept from Python

Exploration Hands-on application of the concept introduced.

Introduction

0000

First Steps

Mork in groups and collaborate if you prefer! Ex

the material in a hands-on manner
What have we learned through our exploration?

What surprises did we encounter? What mysteries did we uncovered?

Application With our newly "invented" knowledge, what can we



Control Flow

Libraries

Data Types

Learning Cycle

First Steps

Introduction

Introduction Short lecture introducing a new concept from Python

 ${\color{red}\textbf{Exploration}} \ \ \textbf{Hands-on application of the concept introduced}.$

the material in a hands-on manner
What have we learned through our exploration?

Work in groups and collaborate if you prefer! Explore

What surprises did we encounter? What mysteries did we uncovered?

Application With our newly "invented" knowledge, what can we do? This leads into a new exploration phase



Control Flow

Learning Cycle

Introduction Short lecture introducing a new concept from Python

Exploration Hands-on application of the concept introduced.

Work in groups and collaborate if you prefer! Explore the material in a hands-on manner

Invention What have we learned through our exploration?

What surprises did we encounter? What mysterie

What surprises did we encounter? What mysteries did we uncovered?

Application With our newly "invented" knowledge, what can we do? This leads into a new exploration phase



Learning Cycle

Introduction Short lecture introducing a new concept from Python

Exploration Hands-on application of the concept introduced.

Work in groups and collaborate if you prefer! Explore the material in a hands-on manner

Invention What have we learned through our exploration?

What surprises did we encounter? What mysteries did we uncovered?

Application With our newly "invented" knowledge, what can we do? This leads into a new exploration phase



Libraries

What is Programming?

First Steps

Programming is simply the act of entering instructions for the



Control Flow

PySprings

Introduction

0000

Libraries

Data Types

What is Programming?

Introduction

0000

- ▶ Programming is a creative activity
- ▶ It doesn't involve much math

First Steps

▶ Programming is simply the act of entering instructions for the computer to perform



Control Flow

What is Programming?

Introduction

0000

- Programming is a creative activity
- ▶ It doesn't involve much math

First Steps

▶ Programming is simply the act of entering instructions for the computer to perform



An Example

Introduction

0000

```
passwordFile = open('SecretPasswordFile.txt')
secretPassword = passwordFile.read()
print('Enter your password.')
typedPassword = input()
if typedPassword == secretPassword:
    print('Access granted')
    if typedPassword == '12345':
        print('That one is used on luggage.')
else:
    print('Access denied')
```



Beginning Python

9

10

First Steps

•0000

PySprings

Libraries

Data Types

Control Flow

Running Python

Libraries

```
Running Python
```

Running Python

```
Example
```

enter the following into the interactive prompt:

First Steps

00000

```
>>> print("Hello, World!")
```

and

>>> **import** this

exit with:

```
>>> exit()
```



Libraries

Data Types

Running a Python Script

Let's create script.py now

First Steps

print("Hello, World!")

and run it with

\$ python3 script.py



Libraries

Invention

Running Python

Introduction

► What problems, if any, did you encounter?

First Steps

00000

- Mhat mysteries if any did you encounter
- ▶ What other take-aways are there from this session, what could vou use from it in the future?



Libraries

Data Types

Invention

Introduction

► What problems, if any, did you encounter?

First Steps

00000

- ► What mysteries, if any, did you encounter?
- ► What other take-aways are there from this session, what could vou use from it in the future?



Control Flow

Running Python

Invention

- ▶ What problems, if any, did you encounter?
- ▶ What mysteries, if any, did you encounter?
- ► What other take-aways are there from this session, what could you use from it in the future?



Running Python

Notation

When you see an example like:

```
>>> print("Hello, World!")
```

it means to type that out in the interactive prompt. When you see an example like:

example.py

```
print("Hello, World!)
```

it means to type that out into a file, in this case, named example.py.



First Steps

•000000

Data Types

Libraries

Control Flow

Expressions

Libraries

```
>>> (1 + 2 + 3 + 4 + 5 + 6) / 6
3.5
>>> 1 - 2*100 + 3*12
- 163
>>> abs(-163)
163
```

First Steps

000000

Python as a Calculator



Expressions

Libraries

Python Math Operations

First Steps

Operators:

Introduction

Expressions

▶ Does python obey order of operations?

Functions

- ▶ abs bin hex oct ord round
- ► divmod min max pow
- ▶ What's the difference between these two lists of functions?



Libraries

Operators:

Introduction

Expressions

Does python obey order of operations

Functions

- ▶ abs bin hex oct ord round
- ► divmod min max pow

First Steps

Python Math Operations

▶ What's the difference between these two lists of functions?



Libraries

Operators:

Introduction

Expressions

Does python obey order of operations

Function

- ▶ abs bin hex oct ord round
- ► divmod min max pow

First Steps

Python Math Operations

► What's the difference between these two lists of functions?



Libraries

Operators:

Python Math Operations

Does python obey order of operations?

Introduction

Expressions

- abs bin hex oct ord round
- divmod min max pow

First Steps

What's the difference between these two lists of functions?



PySprings

Libraries

Operators:

Introduction

Expressions

- **+** *
- **>** % ** //
- ▶ Does python obey order of operations?

Functions:

- ▶ abs bin hex oct ord round
- divmod min max pow

First Steps

▶ What's the difference between these two lists of functions?



Libraries

Data Types

pressio

Introduction

Python Math Operations

First Steps

Operators:

- **>** + *
- **>** % ** //
- ▶ Does python obey order of operations?

Functions:

- abs bin hex oct ord round
 - ► divmod min max pow
 - ▶ What's the difference between these two lists of functions?



Expressions

Python Math Operations

Operators:

- **>** + *
- **>** % ** //
- ▶ Does python obey order of operations?

Functions:

Beginning Python

- ▶ abs bin hex oct ord round
 - divmod min max pow
- ▶ What's the difference between these two lists of functions?



PySprings

Expressions

Python Math Operations

Operators:

- **>** + * /
- **>** % ** //
- ▶ Does python obey order of operations?

Functions:

- abs bin hex oct ord round
- divmod min max pow
- ▶ What's the difference between these two lists of functions?



Libraries

Invention

Introduction

Expressions

▶ What problems, if any, did you encounter?

First Steps

0000000

- Mhat mysteries if any did you encounter
- ▶ What other take-aways are there from this session, what could you use from it in the future?



Libraries

Invention

Introduction

Expressions

► What problems, if any, did you encounter?

First Steps

0000000

- ▶ What mysteries, if any, did you encounter?
- ▶ What other take-aways are there from this session, what could you use from it in the future?



Control Flow

Libraries

Expressions

Introduction

Invention

- What problems, if any, did you encounter?
- What mysteries, if any, did you encounter?
- What other take-aways are there from this session, what could you use from it in the future?



Control Flow

Libraries

```
Functions
```

Expressions

First Steps

0000000

print('Howdy!') print('Howdy!!!') print('Hello there.')

```
5
hello()
hello()
hello()
```

Libraries

```
Functions
```

Expressions

```
def hello(name):
    print('Hello ' + name)
hello('Alice')
```

hello('Bob')

First Steps

0000000

5



```
def add(a, b):
     return a + b
```

print(add(1,2))

First Steps

000000

print(add(1,2) + add(3,4))



Control Flow

Libraries







Expressions

Functions

Data Types Strings Third-Party Packages Beginning Python PySprings

Data Types

•0000000

Libraries

Control Flow

First Steps

Strings

Outline

0000000

Libraries

Strings

Strings

"This is 'a' string"
'This is "a" string'

First Steps

We can also get more information from python:

```
>>> help(str)
```



0000000

Libraries

Control Flow

First Steps

"This is a string."

>>> help(str)

'This is also a string.'
"This is 'a' string"
'This is "a" string'

Strings

Strings

Data Types

Strings

Examples

```
'This is also a string.'
"This is 'a' string"
'This is "a" string'
```

"This is a string."

First Steps

We can also get more information from python:

```
>>> help(str)
```



Data Types

Strings More Examples

First Steps

'This Is A String'

>>> 'this is a string'.title()

```
>>> 'this is a string'.upper()
'THIS IS A STRING'
>>> 'what ARE you doing!?'.lower()
'what are you doing!?'
>>> " there's whitespace in this ".strip()
"there's whitespace in this string."
```

Data Types

String

Hello again

```
hello.py
```

```
name = input('What is your name? ')
print('Hello, ' + name + '!')
```

let's try it!

\$ python3 hello.py

First Steps



0000 0000

Libraries

Introduction

Invention

Strings

First Steps

- ► What other take-aways are there from this session, what could



0000 0000

Libraries

Invention

Introduction

► What problems, if any, did you encounter?

First Steps

- ► What mysteries, if any, did you encounter?
- ▶ What other take-aways are there from this session, what could you use from it in the future?



Control Flow

Beginning Python PySprings

Strings

Introduction

Invention

- What problems, if any, did you encounter?
- What mysteries, if any, did you encounter?
- What other take-aways are there from this session, what could you use from it in the future?



Control Flow

Beginning Python PySprings

00000000

Libraries

```
Indexing
```

Strings

```
>>> s = 'We
>>> s[0]
'W'
>>> s[-1]
'!'
>>> s[7:10]
'the'
>>> s[-7:-4]
'say'
```

First Steps

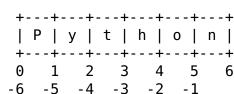


00000000

Libraries

Indexing

Strings



First Steps



0000000

Libraries

Invention

Introduction

Strings

What problems, if any, did you encounter?

First Steps

- ► What mysteries if any did you encounter
- ▶ What other take-aways are there from this session, what could you use from it in the future?



0000000

Libraries

Invention

Introduction

► What problems, if any, did you encounter?

First Steps

- ► What mysteries, if any, did you encounter?
- ▶ What other take-aways are there from this session, what could vou use from it in the future?



Control Flow

Beginning Python PySprings

Strings

Invention

- ► What problems, if any, did you encounter?
- ▶ What mysteries, if any, did you encounter?
- ► What other take-aways are there from this session, what could you use from it in the future?



Beginning Python PySprings

Data Types
Strings
Lists
Dictionaries
Libraries
Environments
Third-Party Packages
Control Flow
Booleans

Data Types

•000

Libraries

Control Flow

PySprings

First Steps

Lists

Outline

Beginning Python

Lists

Lists

```
>>> mylist = [1, 2, 'three', "4", 5.3]
>>> s = "What are the words in this string?"
>>> s.split()
['What', 'are', 'the', 'words', 'in', 'this',
   'string?'l
>>> words = s.split()
>>> words.sort()
>>> words
['What', 'are', 'in', 'string?', 'the', 'this'
   . 'words'l
```

0000

Libraries

First Steps

Pu**Š**prings

Lists

Lists

What are the methods of list?

>>> help(list)

>>> dir(list)

and try out:

Libraries

NAMES assertation if any did you are assertant

First Steps

► What other take-aways are there from this session, what could vou use from it in the future?



Control Flow

Introduction

Invention

Lists

Data Types

Invention

Introduction

► What problems, if any, did you encounter?

First Steps

- ► What mysteries, if any, did you encounter?
- ▶ What other take-aways are there from this session, what could you use from it in the future?



Control Flow

Beginning Python PySprings

Lists

Invention

- ▶ What problems, if any, did you encounter?
- ▶ What mysteries, if any, did you encounter?
- ► What other take-aways are there from this session, what could you use from it in the future?



Outline Data Types **Dictionaries** Third-Party Packages

First Steps

PySprings

Control Flow

Data Types

•000

Libraries

Dictionaries

Dictionaries

Dictionaries

```
>>> myCat = {'size': 'fat', 'color': 'gray',
... 'disposition': 'loud'}
>>> myCat['size']
'fat'
>>> 'My cat has ' + myCat['color'] + ' fur.'
'My cat has gray fur.'
```



0000

Libraries

Remember:

Dictionaries

Dictionaries

>>> help(dict) >>> dir(dict)

What are the methods of list?

First Steps



000

Libraries

Invention

Introduction

Dictionaries

First Steps

- ► What other take-aways are there from this session, what could



000

Libraries

What problems, if any, did you encounter?

First Steps

- What mysteries, if any, did you encounter?
- ► What other take-aways are there from this session, what could



Dictionaries

Invention

- ► What problems, if any, did you encounter?
- ▶ What mysteries, if any, did you encounter?
- ► What other take-aways are there from this session, what could you use from it in the future?



Data Types
Strings
Lists
Dictionaries
Libraries
Environments

Data Types

Libraries

0000

Control Flow

PySprings

First Steps

Environments

Outline

Beginning Python

Data Types

Introduction

Environments

virtualenv

virtualenv raindrop

First Steps

- . raindrop/source/bin/activate # Linux and OSX
- randrop\Scripts\activate # Windows



Running Python
Expressions
Data Types
Strings

Data Types

Libraries

•000

First Steps

Third-Party Packages

Libraries

Third-Party Packages

Outline

Libraries

00

Installing Third-Party Packages

First Steps

Third-Party Packages

\$ pip3 install requests



PySprings

Third-Party Packages

Finding Third-Party Packages

First Steps

https://pypi.org/(newer) https://pypi.python.org (original)



Control Flow

Libraries

00 00•0

Third-Party Packages

Requests Example

```
requests_script.py
```

```
import requests
resp = requests.get('http://httpbin.org/ip')
print(resp.json())
```



Data Types
Strings
Lists
Dictionaries
Libraries
Environments
Third-Party Packages
Control Flow
Booleans

Data Types

Libraries

Control Flow

PySprings

First Steps

Booleans

Outline

Beginning Python

First Steps

Data Types

Libraries

Control Flow

Booleans

Booleans

True

False

False

True

>>> bool([])

>>> **bool**([42])

>>> **bool**(1)

Expressions

Data Types

Strings

Lists

Data Types

Libraries

Control Flow

PySprings

First Steps

Third-Party Packages

Looping and Branching

Control Flow

Beginning Python

Looping and Branching

Outline

First Steps

```
>>> f
...
This
Is
A
List
```

Control Flow

Libraries

Words

Libraries

Looping and Branching

First Steps

```
password = input(
    "Enter the secret word: "
)
if password == "sesame":
    print("Access granted.")
else:
    print("Access denied!")
```

Boolean operators

```
▶ == != <= >= > < in
```



Libraries

Looping and Branching

First Steps

```
password = input(
    "Enter the secret word: "
)
if password == "sesame":
    print("Access granted.")
else:
    print("Access denied!")
Boolean operators:
    = != <= >= > < in</pre>
```



Libraries

Invention

Looping and Branching

▶ What problems, if any, did you encounter?

First Steps

- ► What mysteries if any did you encounter
- ▶ What other take-aways are there from this session, what could you use from it in the future?



Libraries

Data Types

Invention

► What problems, if any, did you encounter?

First Steps

- ► What mysteries, if any, did you encounter?
- ▶ What other take-aways are there from this session, what could you use from it in the future?



Invention

- ▶ What problems, if any, did you encounter?
- ▶ What mysteries, if any, did you encounter?
- ► What other take-aways are there from this session, what could you use from it in the future?



Looping and Branching While Loop

```
while True:
    password = input("Enter the secret word: ")
    if password == "sesame":
        print("Access granted.")
        break
    else:
        print("Access denied!")
```



Libraries

Invention

Looping and Branching

► What problems, if any, did you encounter?

First Steps

- Mhat mysteries if any did you encounter
- ▶ What other take-aways are there from this session, what could you use from it in the future?



Libraries

Data Types

Invention

► What problems, if any, did you encounter?

First Steps

- ► What mysteries, if any, did you encounter?
- ▶ What other take-aways are there from this session, what could you use from it in the future?



Control Flow

Invention

- ▶ What problems, if any, did you encounter?
- ▶ What mysteries, if any, did you encounter?
- ► What other take-aways are there from this session, what could you use from it in the future?



Looping and Branching elif

```
age = int(input("How old are you? "))
if age < 18:
    print("You're not old enough dance.")
elif age == 18:
    print("Welcome, is it your first time here?")
else:
    print("You can dance if you want to, you can le</pre>
```



Practice Problems

- ▶ Write code that prints Hello if 1 is stored in spam, prints Howdy if 2 is stored in spam, and prints Greetings! if anything else is stored in spam.
- Write a short program that prints the numbers 1 to 10 using a for loop. Then write an equivalent program that prints the numbers 1 to 10 using a while loop.
- ▶ Write a function named collatz() that has one parameter named number. If number is even, then collatz() should print number // 2 and return this value. If number is odd, then collatz() should print and return 3 * number + 1.



Control Flow

000000000000000

Practice Problems

► Say you have a list value like this:

```
spam = ['apples', 'bananas', 'tofu', 'cats']
```

Write a function that takes a list value as an argument and returns a string with all the items separated by a comma and a space, with the word "and" inserted before the last item. For example, passing the previous spam list to the function would return 'apples, bananas, tofu, and cats'. But your function should be able to work with any list value passed to it.



Practice Problems

➤ You are creating a fantasy video game. The data structure to model the player's inventory will be a dictionary where the keys are string values describing the item in the inventory and the value is an integer value detailing how many of that item the player has. For example, the dictionary value

```
{'rope': 1, 'torch': 6, 'gold coin': 42,
  'dagger': 1, 'arrow': 12}
```

means the player has $1\ \text{rope},\ 6\ \text{torches},\ 42\ \text{gold coins},\ \text{and so}$ on.



Libraries

Looping and Branching

Introduction

Practice Problems

Write a function named displayInventory() that would take any possible "inventory" and display it like the following:

```
Inventory:
```

- 12 arrow
- 42 gold coin
- rope
- 6 torch
- 1 dagger
- Total number of items: 62



Conclusion

- ► Final Takeaways (1-2-4-all)
- Survey https://goo.gl/forms/ZpNl0z8pw5J8J8Rv1
- Feedback https://sayat.me/pysprings
- ▶ Based on https://automatetheboringstuff.com/ released under released under <a href="mai



Projects!

- Daily Programmer https://www.reddit.com/r/dailyprogrammer/
 - ► Game of Threes https://redd.it/3r7wxz
 - Rövarspråket (Robber's Language) https://redd.it/341c03
- WordPlay https://github.com/jesstess/Wordplay
- Colorwall https://github.com/jesstess/ColorWall

