

NOAC 2024

CU Boulder

A stylized graphic of a mountain range with jagged peaks. The mountains are filled with a bright orange color and have a white outline. They are set against a dark blue background that forms a horizontal band across the top of the slide.

SEEK NEW HEIGHTS

Code Crafting Essentials

Using Python for Success

Learning Objectives

1. Learn the basics of Python
 - a. Data types and variables
 - b. Basic operators and functions
 - c. Input & output
 - d. Using a dataframe and JSON files
2. Understand the resources available to teams in creating their Hackathon solutions





1.

Getting Started

IDEs, Google Colab, Replit



Integrated Development Environment

- Also known as an IDE
- Contains various development tools:
 - Text Editor
 - Compiler
 - Debugger
 - Terminal
 - Version control
- Online IDEs
 - replit.com, Google Colab



Google Colab

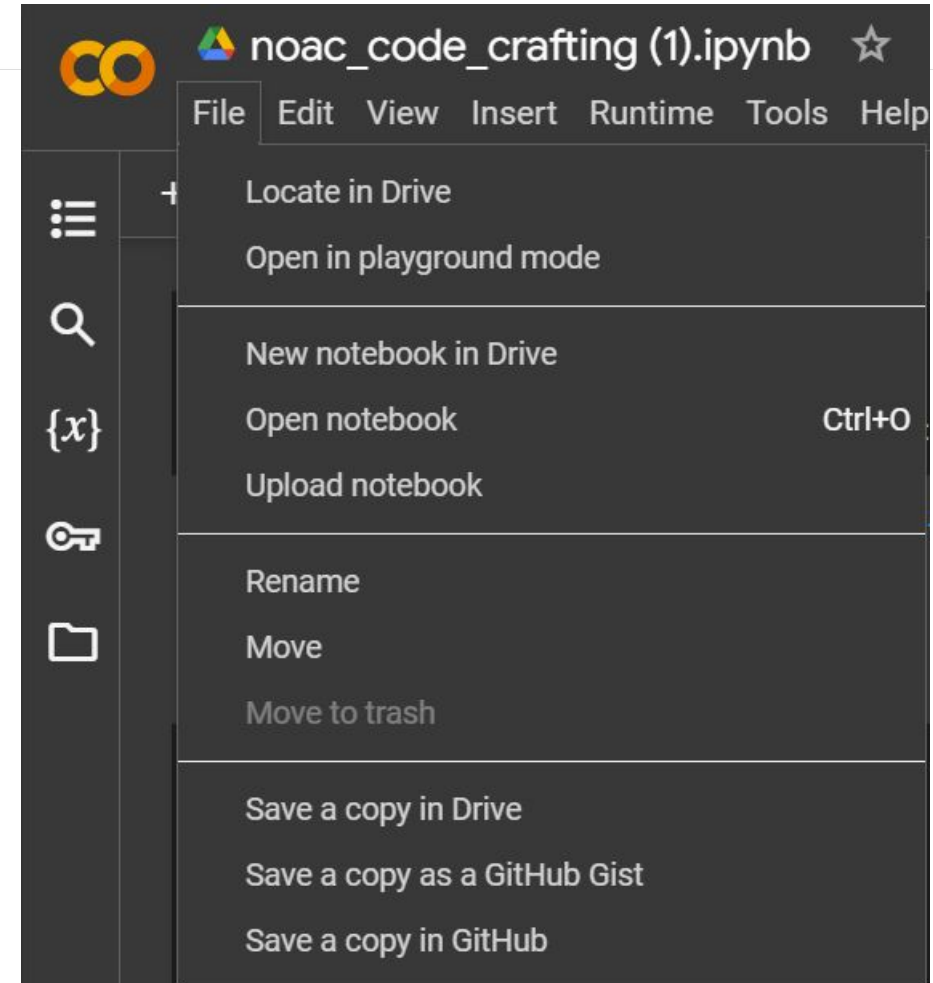
- Hosts Jupyter Notebooks
- **Project Jupyter**
- Non-profit, Open Source
- Interactive Data Science and Scientific Computing

<https://jupyter.org/about>



Copy Sample Code

1. Open Google Colab
2. Open our sample code
3. Save a copy in Drive

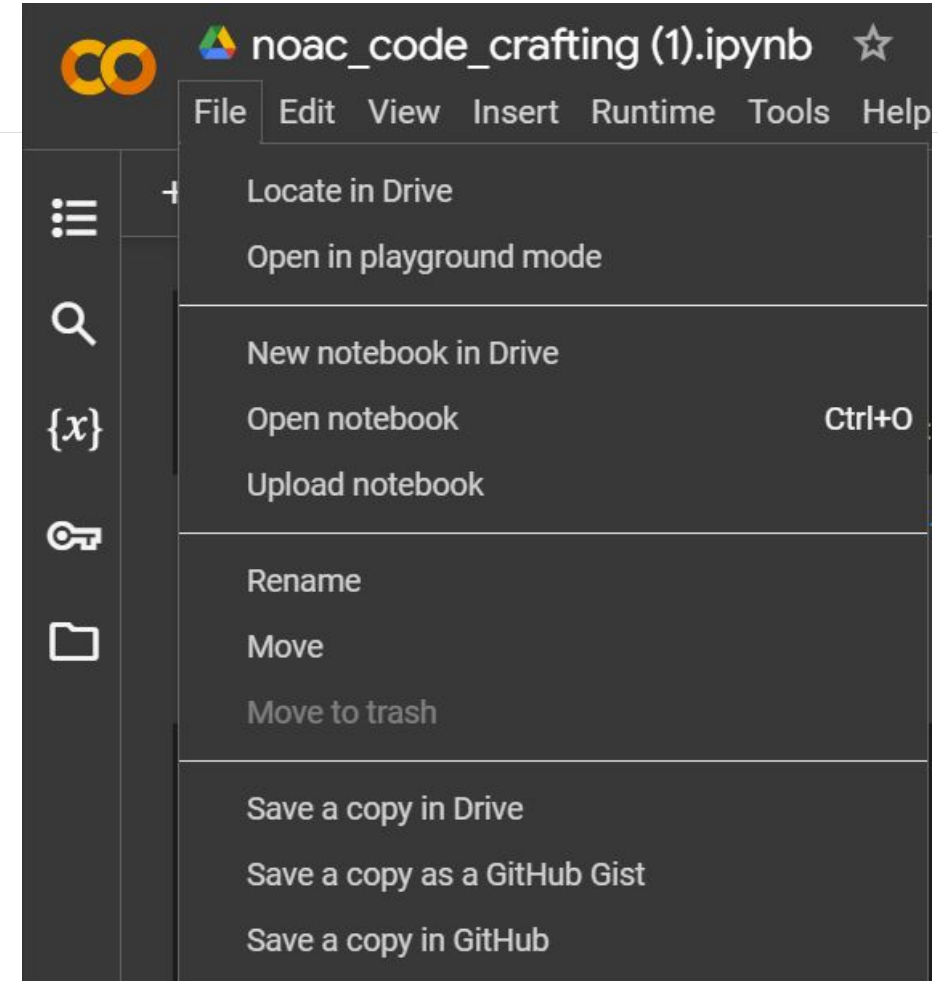


<https://tinyurl.com/OAHackCode>



Copy Sample Code

1. Open Google Colab
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https://drive.google.com/drive/folders/1j5aaM427v8nz3sHn3vYlv_v2KeaC6FTn?usp=drive_link





2.

The Basics

Syntax, Data Types, Operators, I/O, etc.



Sample Print Statement

EX1: Here is an example Print statement concatenated with a String variable

```
training = "Code Crafting"  
  
print("Hello World! Welcome to ", training)
```

Hello World! Welcome to Code Crafting



Data Types

Numeric

- Integer
- Float

```
#Numeric  
num1 = 34 #Integer  
num2 = 3.0101 #Float
```



Data Types

- Sequence
 - String
 - List
 - Tuple

```
#Sequence  
words = "Welcome to NOAC!" #String  
list1 = [1,2,3] #list/array, contents can be changed  
tup = (1, 2, 3) #tuple, contents cannot be changed after initialization
```



Data Types

- Mapping
 - Dictionary

```
#Mapping  
dictionary = {"name": "Scout", "rank": "Star"} #Stores data in value pairs.
```



Calculations & Operators

Addition +

Subtraction -

Multiplication *

Division /

Exponent **

Modulus (remainder) %

Floor Division //

You can use multiple numeric data types in an equation



```
x = 5
y = 3
pi = 3.14

#Addition & Subtraction + -
addXY = x+y
print("Addition:", addXY)
subXY = x-y
print("Subtraction:", subXY)

#Multiplication & Division * /
multXY = x*y
print("Multiplication:", multXY)
divXY = x/y
print("Division:", divXY)
```

```
Addition: 8
Subtraction: 2
Multiplication: 15
Division: 1.6666666666666667
```



```
#Exponent **
powerXY = x**y
print("Exponent:", powerXY)

#Modulus % (remainder)
modXY = x%y
print("Modulus:", modXY)

#Floor Division //
floorXY = x//y
print("Floor Division:", floorXY)

#Using Different Data Types
print("You can use math operators across numeric data types:", x, "+", pi, "=", x+pi)
```

```
x = 5
y = 3
pi = 3.14
```

Exponent: 125

Modulus: 2

Floor Division: 1

You can use math operators across numeric data types: 5 + 3.14 = 8.14



User Input

```
user_num = input("Enter a number:")  
user_name = input("Enter your name:")
```

```
Enter a number: 123  
Enter your name: Joe
```



Conditionals & Code Blocks

== equal to

!= not equal to

< less than

<= less than or equal to

> greater than

>= greater than or equal to

```
num1 = 5
num2 = 19

if num1 < num2:
    print(num1, "is a small number")
elif num1 > num2:
    print(num1, "is a big number")
else:
    print(num1, "is equal to num2!")
```

```
letters = ['a', 'b', 'c']
```

```
if 'a' in letters:
    print("a is in the list")
else:
    print("a is not in the list")
```

```
5 is a small number
a is in the list
```



Conditionals

is tests if two objects are the same

is not tests if two values are not the same object

in tests if a value is in a sequence

not in tests if a value is not in a sequence

```
num1 = 5
num2 = 19

if num1 < num2:
    print(num1, "is a small number")
elif num1 > num2:
    print(num1, "is a big number")
else:
    print(num1, "is equal to num2!")
```

```
letters = ['a', 'b', 'c']
```

```
if 'a' in letters:
    print("a is in the list")
else:
    print("a is not in the list")
```

```
5 is a small number
a is in the list
```



Loops

For loops iterate over a sequence

While loops run while a condition is true

```
states = ["Colorado", "Missouri", "Arkansas", "Texas", "Florida"]  
  
for state in states:  
    print(state)
```

```
Colorado  
Missouri  
Arkansas  
Texas  
Florida
```



Loops

For loops iterate over a sequence

While loops run while a condition is true

```
for i in range(5):  
    print(i)
```

0
1
2
3
4

```
count = 0  
while count != 5:  
    print(count)  
    count+=1
```

0
1
2
3
4



Loops

For loops iterate over a sequence

While loops run while a condition is true

```
import random

foo = True
while foo:
    rand = random.randint(1, 10)
    print(rand)
    if rand == 2:
        foo = False
```

3
9
1
2



Libraries

Collections of pre-written code for common tasks

Python supplies a list of it's own libraries which includes math, datetime, os, sys, random, json, re (RegEx), and more.

There are also various third-party libraries that can be added to a program.

For the purposes of future examples, we use Pandas, a data manipulation and analysis library using dataframes and matplotlib, which helps create visuals within python. We also use JSON from the standard library.



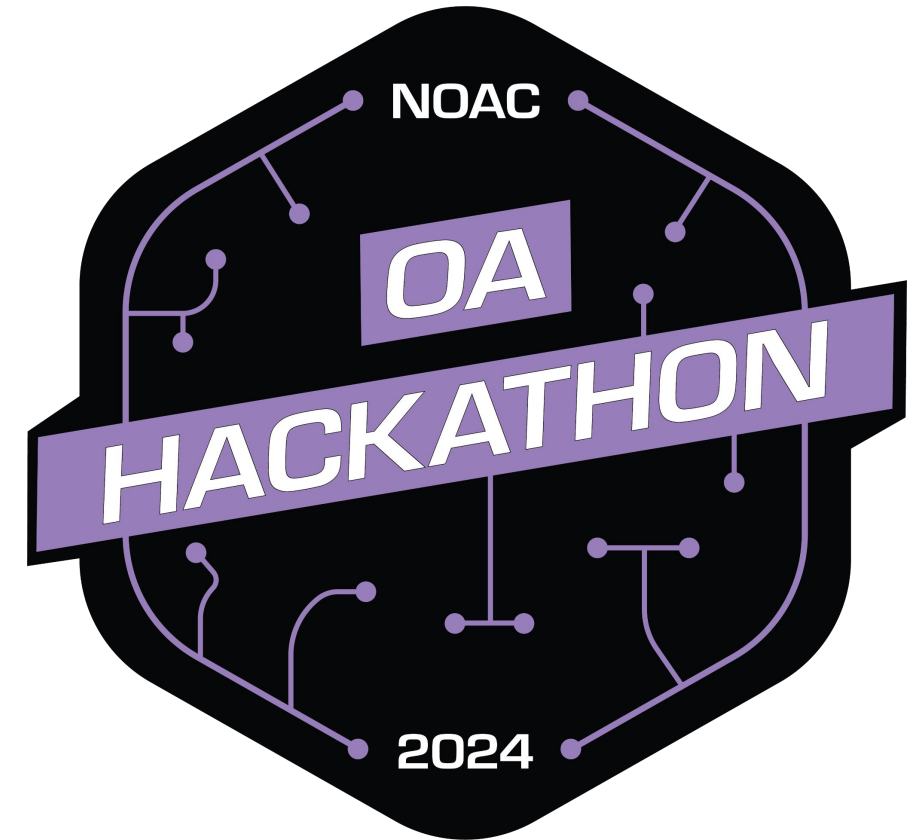


3. Example



Broad Hackathon Problem Statement

How do we leverage technology to support the OA?





4.

Resources



Resources

[Codecademy](#)

[LearnPython.org](#)

[YouTube](#)

[Jupyter Notebooks](#)

[Replit](#)

[Additional IDEs](#)

[Pandas](#)

[Matplotlib](#)



Thanks for Joining!

It's your turn!

What can your team create?



NOAC 2024

UC Boulder



SEEK NEW HEIGHTS

Ascent Code

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Thank you!

