Reading, Writing and Pyrithmetic

Data Boot Camp

Lesson 3.2

Class Objectives

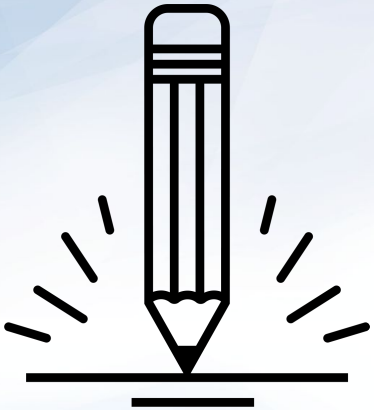
By the end of today's class you will be able to:

Read data into Python from CSV files.

Write data from Python to CSV files.

Zip two files together and know when this is helpful.

Understand well how to create and use Python functions.



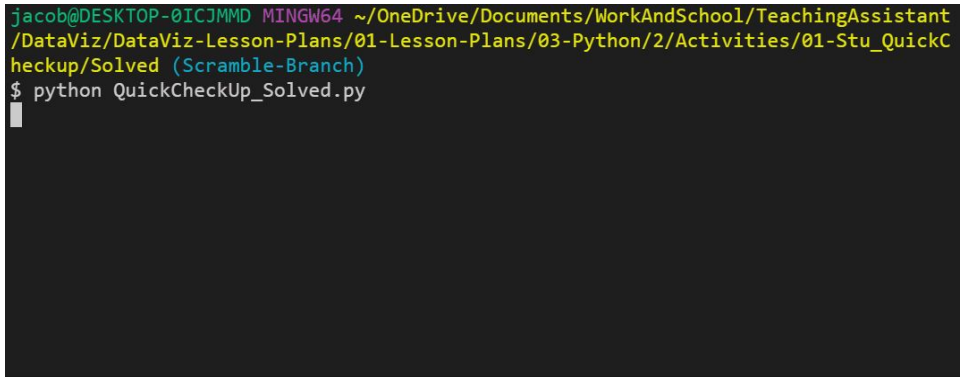
Activity: Python Check-Up

In this activity, you will start with a quick warm up activity to get the Python juices flowing!

Suggested Time:
10 Minutes

Activity: Python Check-Up

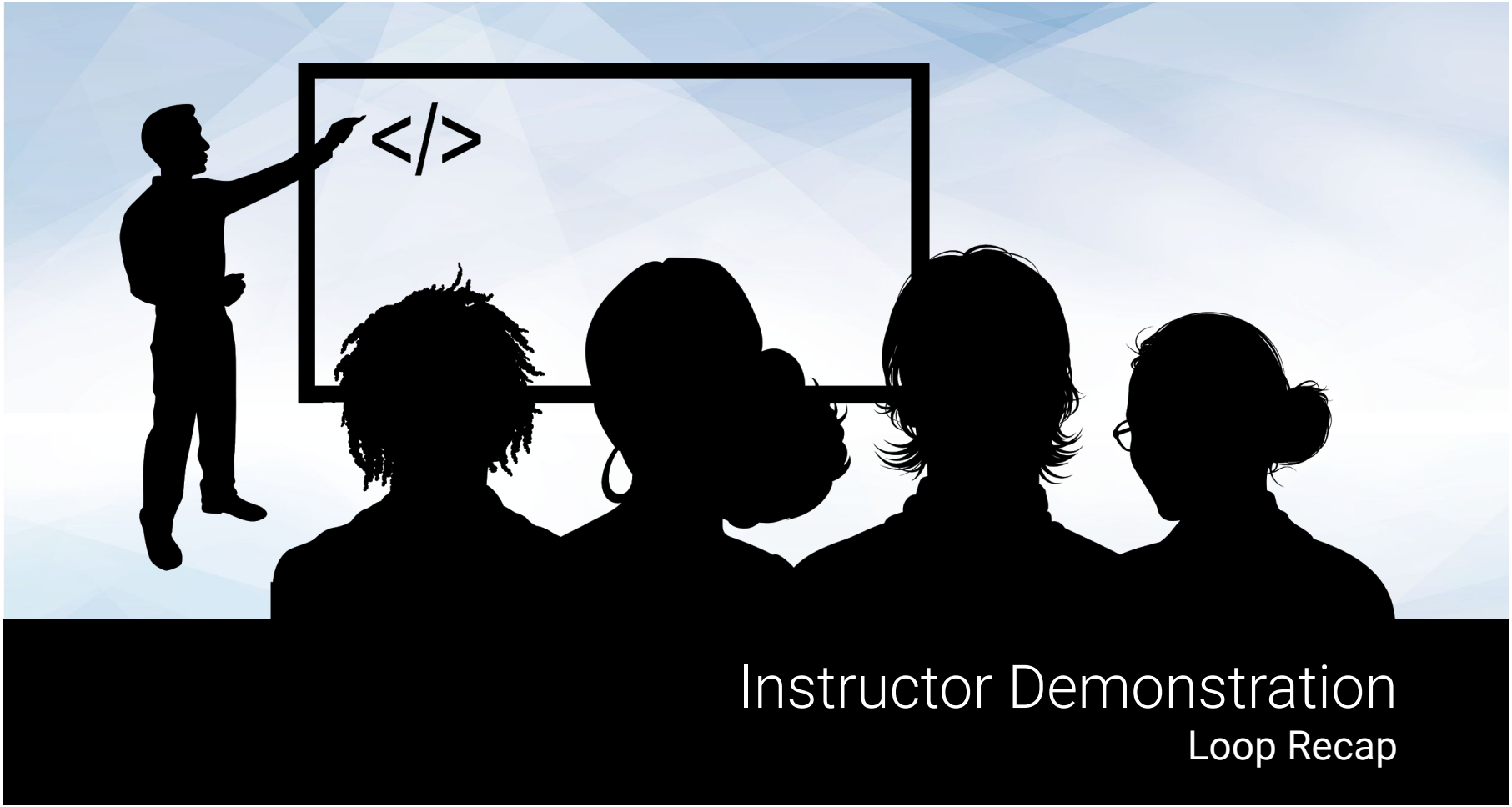
- Create simple Python command line application. The application should:
  - Print: “Hello User!”
  - Then ask: “What is your name?”
  - Then respond: “Hello <user’s name>”
  - Then ask: “What’s your age?”
  - Then respond: “Awwww… you’re just a baby!” or “Ah… A well traveled soul are ye.” depending on the user’s age.



What time is it? It's showtime!

Nope! It’s time to check your SLACK!

Time’s Up! Let’s Review.

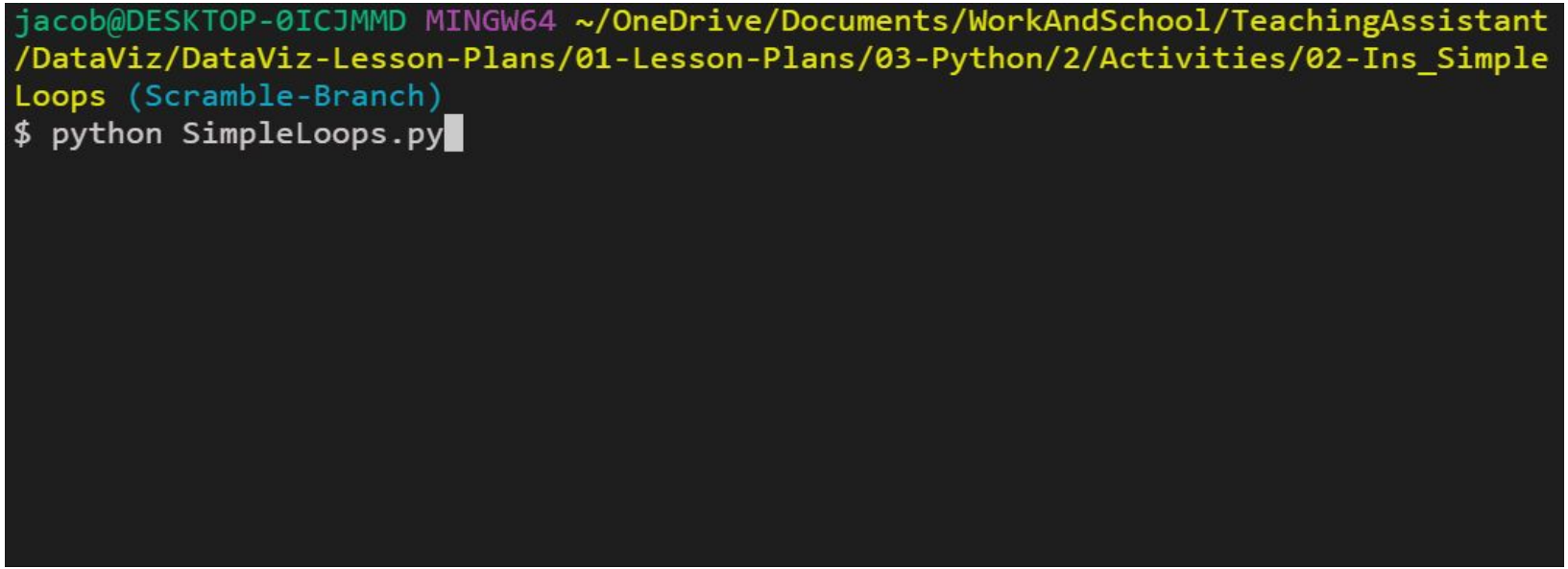


Instructor Demonstration

Loop Recap

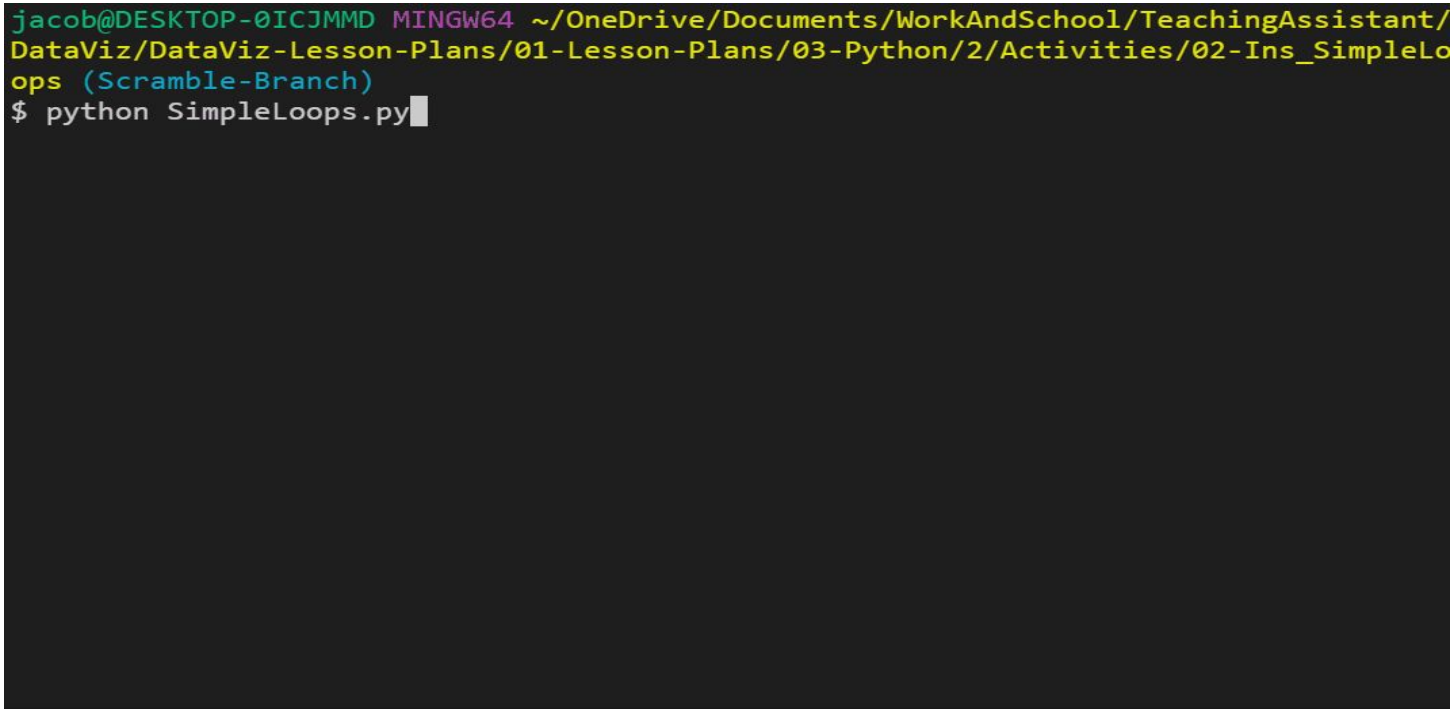
Loop Recall

- Loops through a range of numbers, the letters in a string, or the elements within a list one by one.

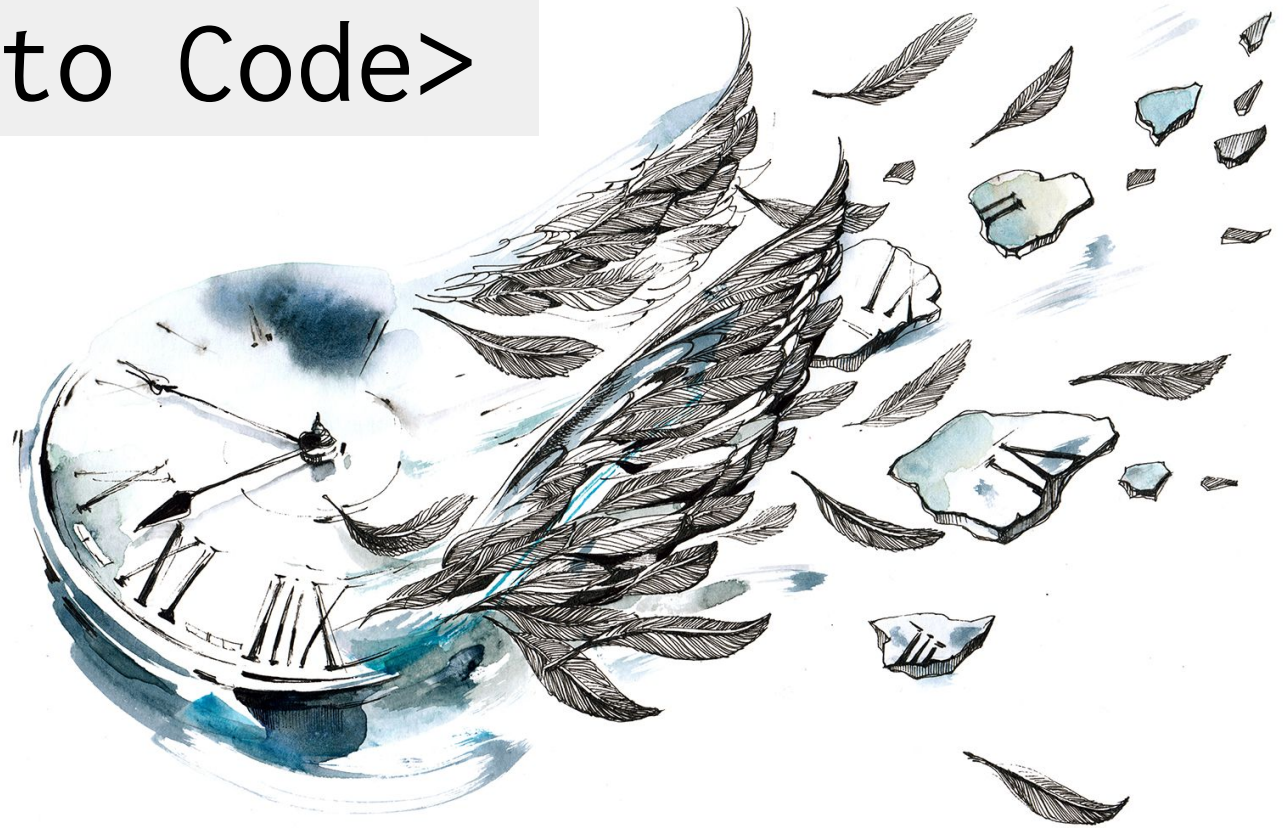


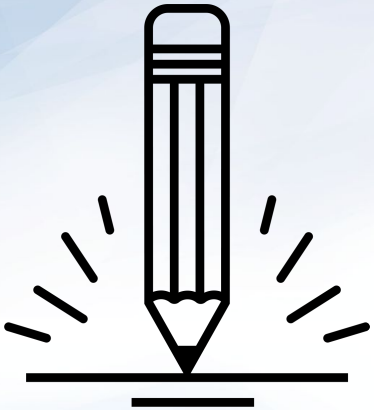
Loop Recall

- Loops through the code contained inside of it until some condition is met.



<Time to Code>





Activity: Kid in a Candy Store

In this activity, you will be placed in the role of a kid going with their parents to the supermarket. After pestering their parents for a while, they finally are allowed to pick out some candy to take home.

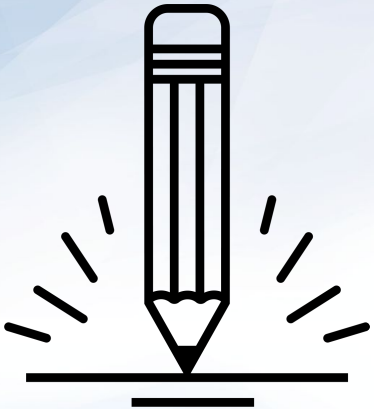
Suggested Time:
15 Minutes

Instructions:

Activity: Kid in a Candy Store

- Create a loop that prints all of the candies in the store to the terminal with their index stored in brackets beside them.
  - For example: “`[0] Snickers`”
- Create a loop that runs for a number of times as determined by the variable `allowance`.
  - For example: If allowance is equal to five, the loop should run five times.
- Each time this second loop runs, take in a user's input - preferably a number - and then add the candy with a matching index to the variable `candy_cart`.
  - For example: If the user enters "0" as their input, "Snickers" should be added into the `candy_cart` list.
- Use another loop to print all of the candies selected to the terminal.
- **Bonus:** Create a version of the same code which allows a user to select as much candy as they want up until they say they do not want any more.

Time’s Up! Let’s Review.



Activity: House of Pies

In this activity, you will be constructing an order form that will display a list of pies and then prompt users to make a selection. It will continue to prompt for selections until the user decides to terminate the process.

Suggested Time:
20 Minutes

Instructions:

Activity: House of Pies

Part 1

- Create an order form that will display a list of pies to the user in the following way:

```
Welcome to the House of Pies! Here are our pies:

_____________________________________________________________________
(1) Pecan, (2) Apple Crisp, (3) Bean, (4) Banoffee,  (5) Black Bun, (6) Blueberry, (7) Buko, (8) Burek
```

- Then prompt the user to select which pie they'd like to order via number.
- Immediately after, follow the order with `Great! We'll have that <PIE NAME> right out for you` and then ask if they would like to make another order. If so, repeat the process.
- Once the user is done purchasing pies, print the total number of pies ordered.

Instructions:

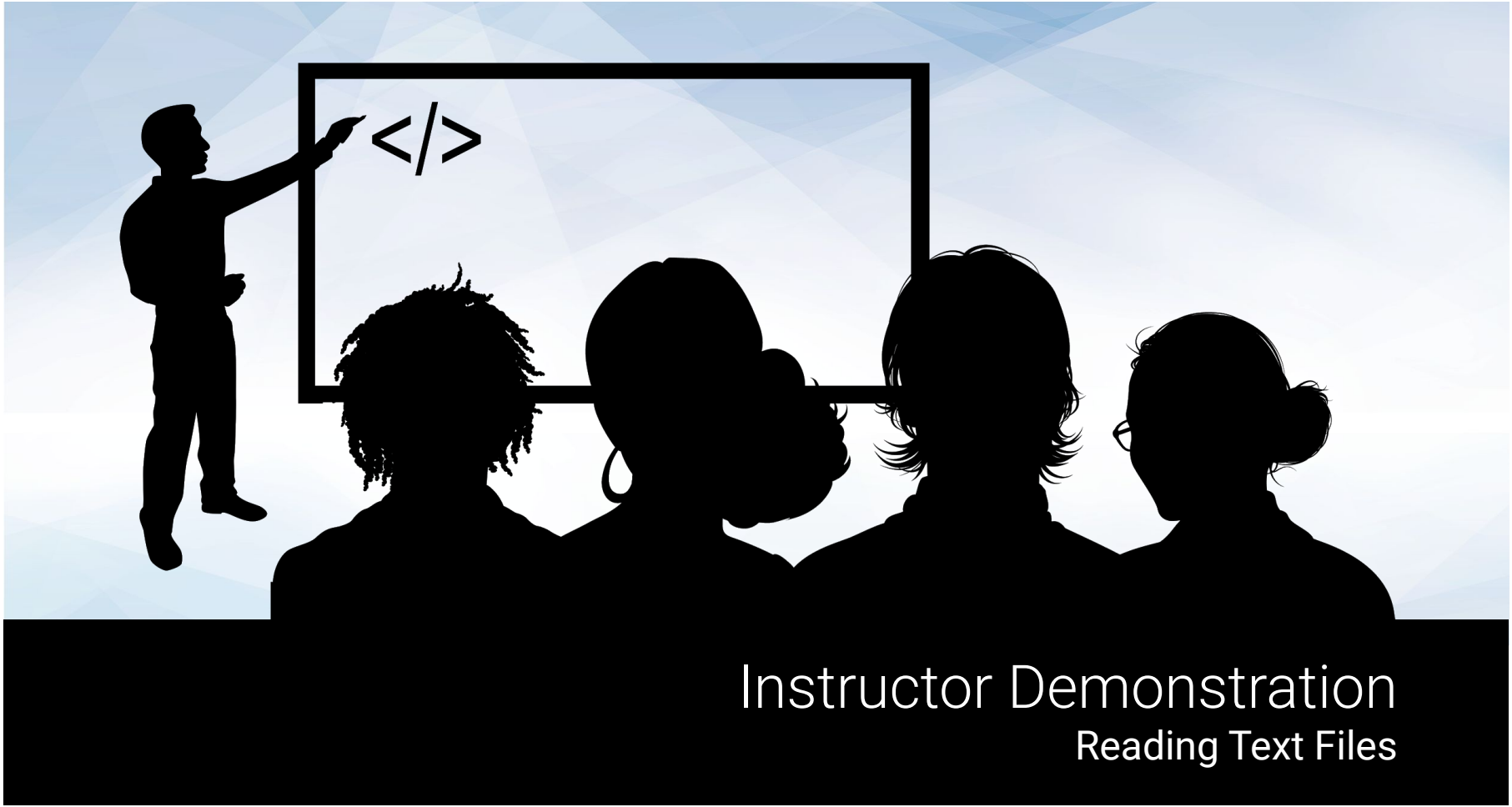
Activity: House of Pies

Part 2

- Modify the application once again, this time conclude the user's purchases by listing out the total pie count broken by *each* pie.

```
You purchased:
0 Pecan
0 Apple Crisp
0 Bean
2 Banoffee
0 Black Bun
0 Blueberry
0 Buko
0 Burek
0 Tamale
1 Steak
```

Time’s Up! Let’s Review.



Instructor Demonstration

Reading Text Files

Python can read data in from external text files to perform some tasks on it!

Reading Text Files

- As we all need directions to move from point A to point B, Python is no different when dealing with external files. It requires very precise directions on what path to follow in order to reach the desired file.
- In this case the desired file is located within a sub-folder called “Resources”, the path we need to tell Python would be “Resources/FileName.txt”.

NOTE: Different operating systems use different ways to set their paths.

```
# Store the file path associated with the file (note the backslash may be OS
specific)
file = 'Resources/input.txt'
```

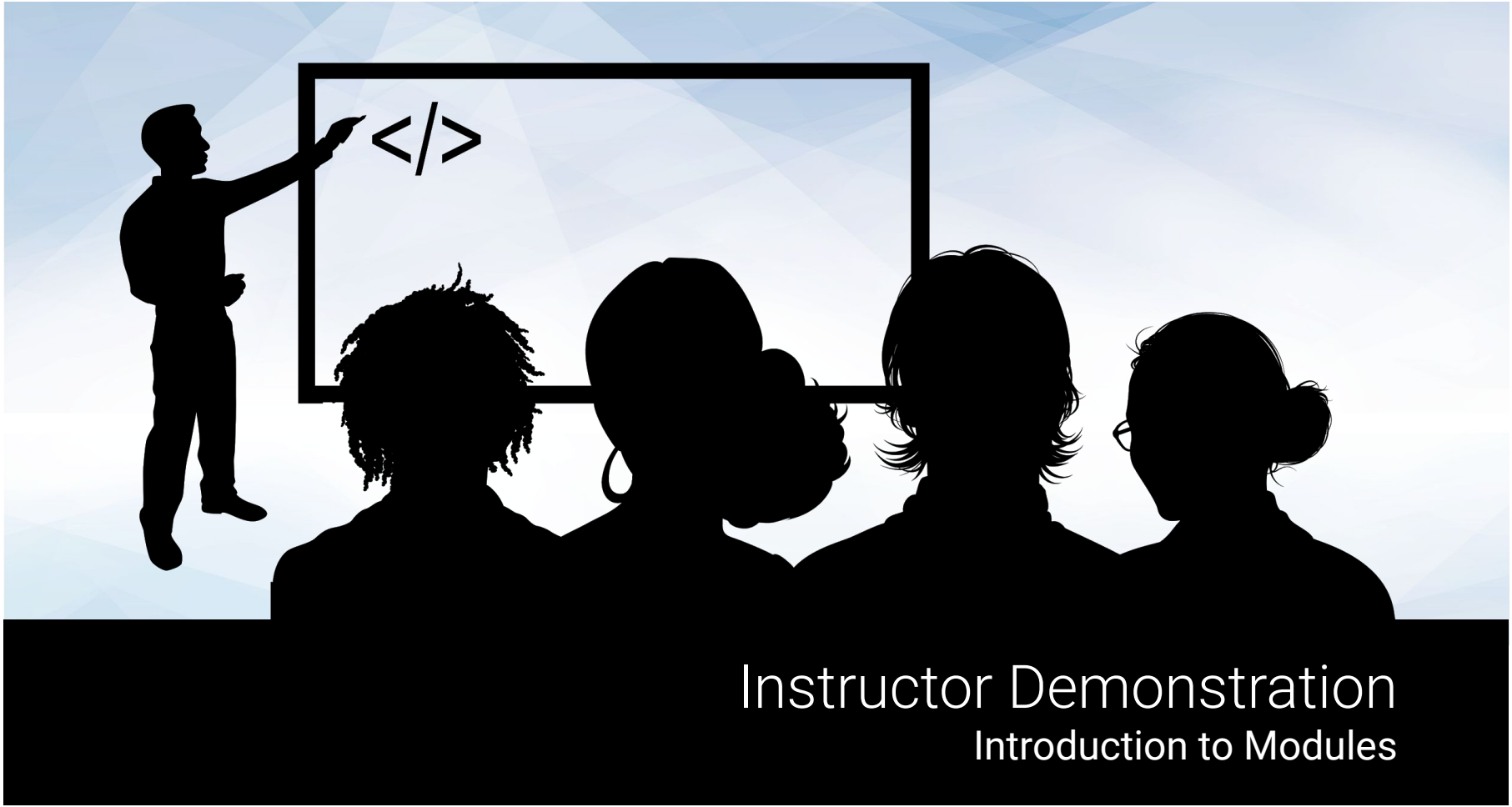
Reading Text Files

- `with` is a special syntactical block that allows to perform operations that require a safety ‘clean-up’ after the code block is completed.
- `open<File Path>, <Read/Write>` is the function Python uses to open a file. The function can be specified with `‘r’`, `‘w’`, or `‘rw’`, in order to only read, only write, or performed both operations.
- `text.read()` reads the entire file converting to a string type.

```
# Open the file in "read" mode ('r') and store the contents in the variable "text"
with open(file, 'r') as text:

    # Store all of the text inside a variable called "lines"
    lines = text.read()

    # Print the contents of the text file
    print(lines)
```



Instructor Demonstration

Introduction to Modules

Relax! We can bring in external modules to perform the specific task.

Introduction to Modules

- The `string` module contains many helpful constants and methods which pertain to strings. For example, users can use `string.ascii_letters` and Python will instantly grab a reference to every ascii character.

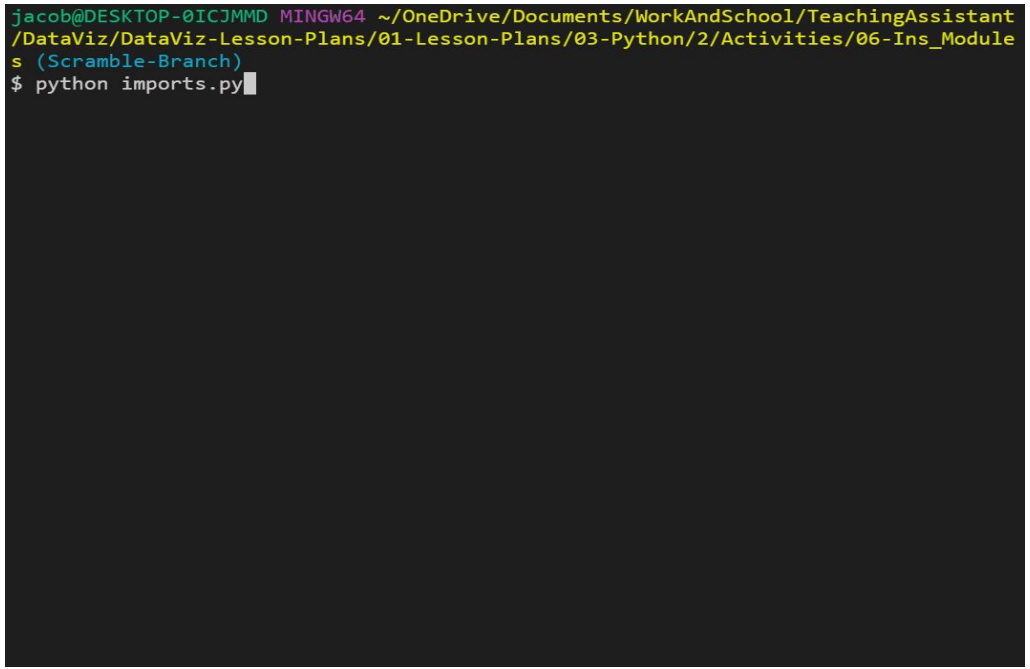
```
jacob@DESKTOP-0ICJMMD MINGW64 ~/OneDrive/Documents/WorkAndSchool/TeachingAssistant
/DataViz/DataViz-Lesson-Plans/01-Lesson-Plans/03-Python/2/Activities/06-Ins_Module
s (Scramble-Branch)
$ python imports.py
```

```python
# Import the String Module
import string

# Utilize the string module's custom method: ".ascii_letters"
print(string.ascii_letters)
```

Introduction to Modules

- The `random` module does exactly what one might expect, it allows Python to randomly select values from set ranges, lists, or even strings.



Introduction to Modules

Import Modules

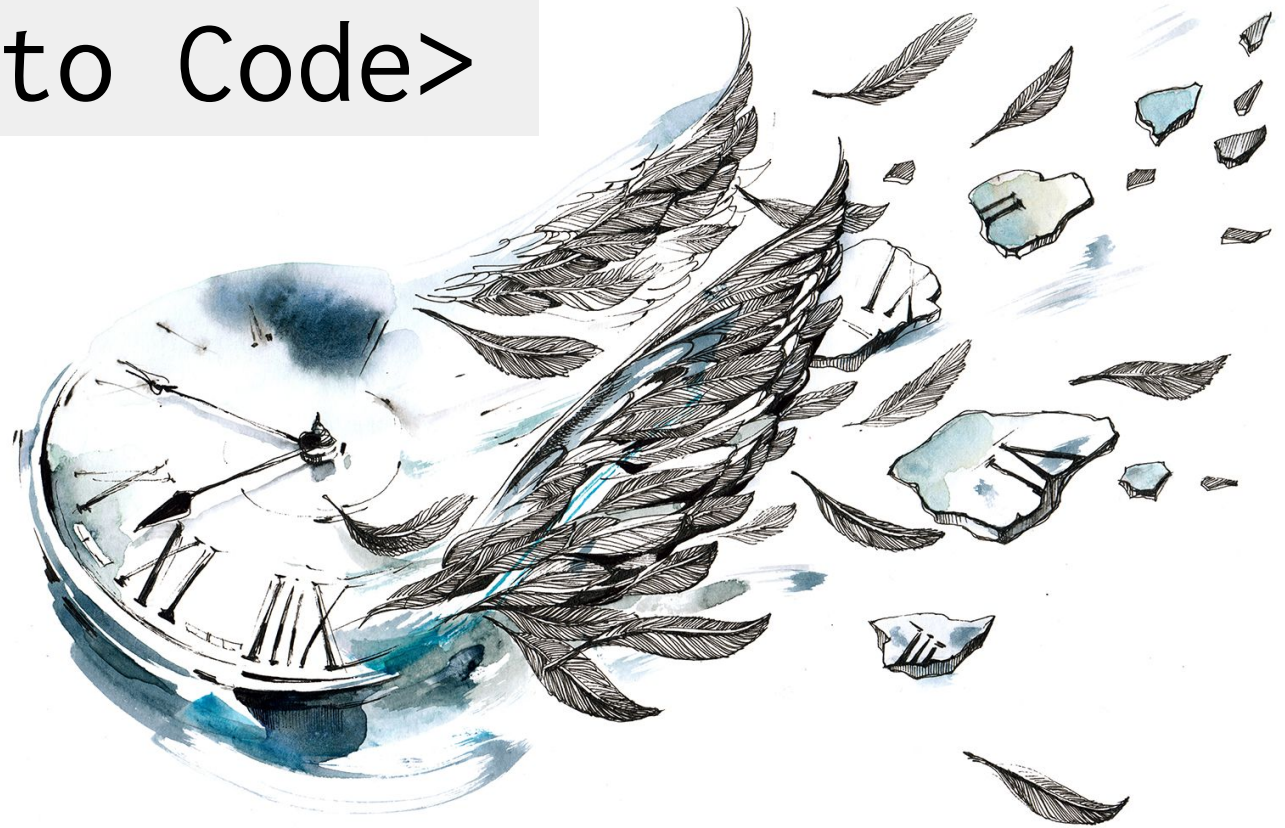
- The `random` module does exactly what one might expect, it allows Python to randomly select values from set ranges, lists, or even strings.

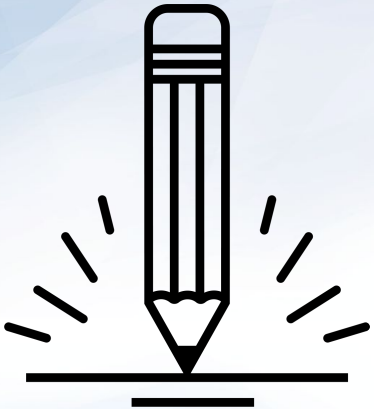
```python
# Import the Random Module
import random

# Utilize the random module's custom method randint
print(random.randint(1,10))
```

```
jacob@DESKTOP-0ICJMMD MINGW64 ~/OneDrive/Documents/WorkAndSchool/TeachingAssistant
/DataViz/DataViz-Lesson-Plans/01-Lesson-Plans/03-Python/2/Activities/06-Ins_Module
s (Scramble-Branch)
$ python imports.py
```

<Time to Code>





Activity: Module Playground

In this activity, you will have the opportunity to explore some of Python's modules and play around with them.

Suggested Time:
5 Minutes

Instructions:

Activity: Module Playground

- There are tons of built-in modules for Python and there is no possible way that a single class could cover all of them.
  - Source yourself Built-In Python modules and share with the class.

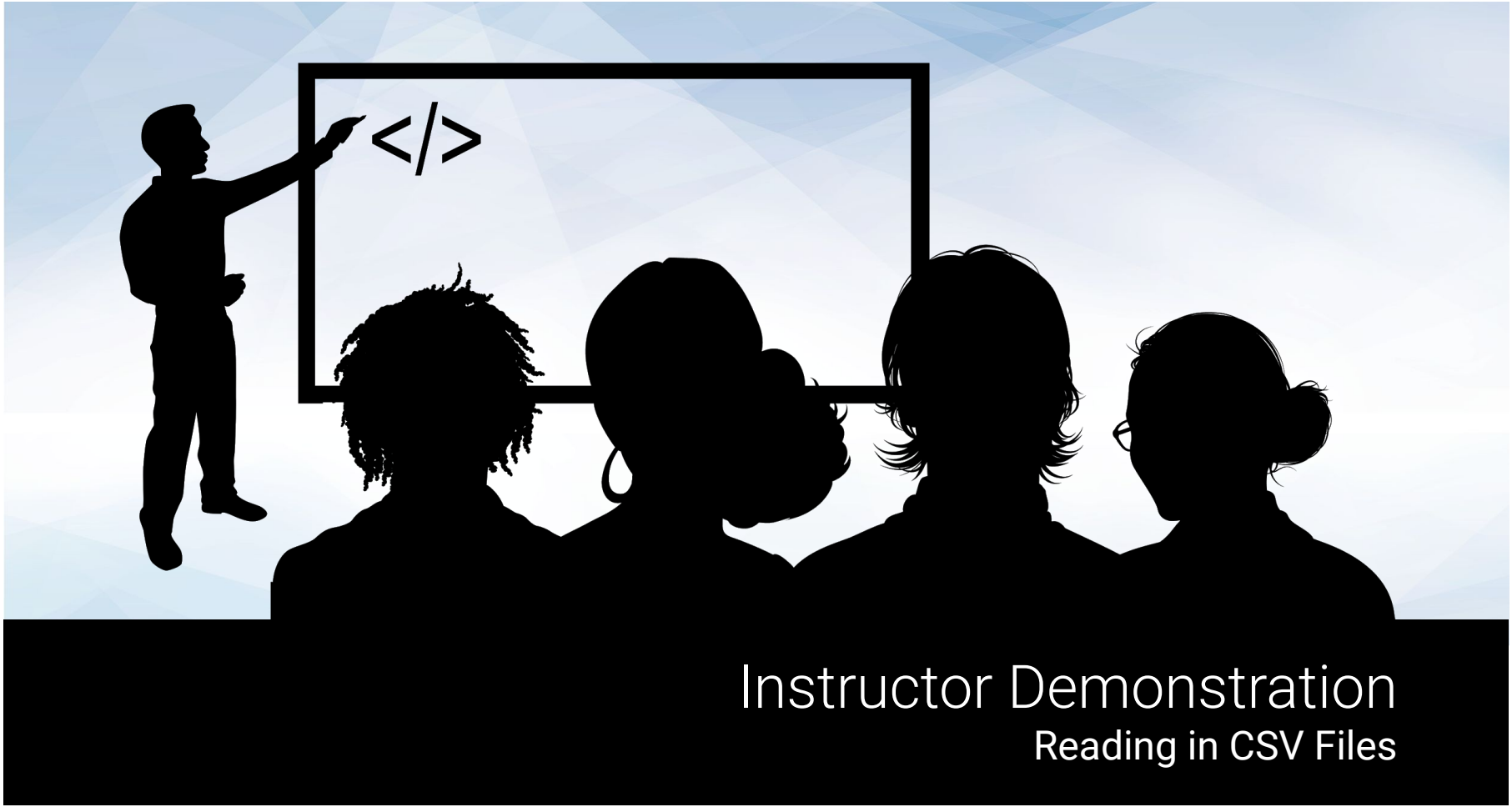
- **Hint:**
  - Use your Google-fu skills. 

Time’s Up! Let’s Review.

Countdown timer

15:00

(with alarm)



Instructor Demonstration

Reading in CSV Files

It is more likely within the data industry to run across files known as **CSV files**.

Reading in CSV Files

- **CSV** stands for **Comma Separated Values** and is essentially a table that has been converted into text format with each row and column being separated by specified symbols.

- More often than not each row is located on a new line and each column is separated by a comma. Seems simple enough since this is why the file type is called Comma Separated Values.

```
First Name,Last Name,SSN
Tina,Fleming,619-16-7988
Erica,Shah,164-51-7615
Paula,Ortiz,051-83-3290
James,Hendricks,776-83-2884
Lauren,King,197-94-2398
David,Cowan,252-92-1832
Andrew,Burton,296-23-6842
Julian,Baker,337-40-7543
Scott,Castro,399-46-5595
Billy,Rodriguez,014-18-2503
Darrell,Leblanc,005-82-7918
David,Hammond,561-17-6312
```

Python has a module called `csv` which pulls in data from external **CSV** files and perform some operations upon them.

os module

Reading in CSV Files

```
# First we'll import the os module
# This will allow us to create file paths across operating systems
import os
csvpath = os.path.join('Resources', 'accounting.csv')
```

- The first major piece of code to point out is the importing and usages of the `os` module. This module allows Python programmers to very easily create dynamic paths to external files that function across different operating systems.

csv reader

Reading in CSV Files

```
import csv
with open(csvpath, newline='') as csvfile:

    # CSV reader specifies delimiter and variable that holds contents
    csvreader = csv.reader(csvfile, delimiter=',')

    print(csvreader)

    #  Each row is read as a row
    for row in csvreader:
        print(row)
```

- Instead of `text.read()`, this new code instead utilizes `csv.reader()` to translate the object being opened by Python. It is critical to note the `delimiter=’,’` parameter being used as this tells Python that each comma within the CSV should be seen as moving into a new column for a row.

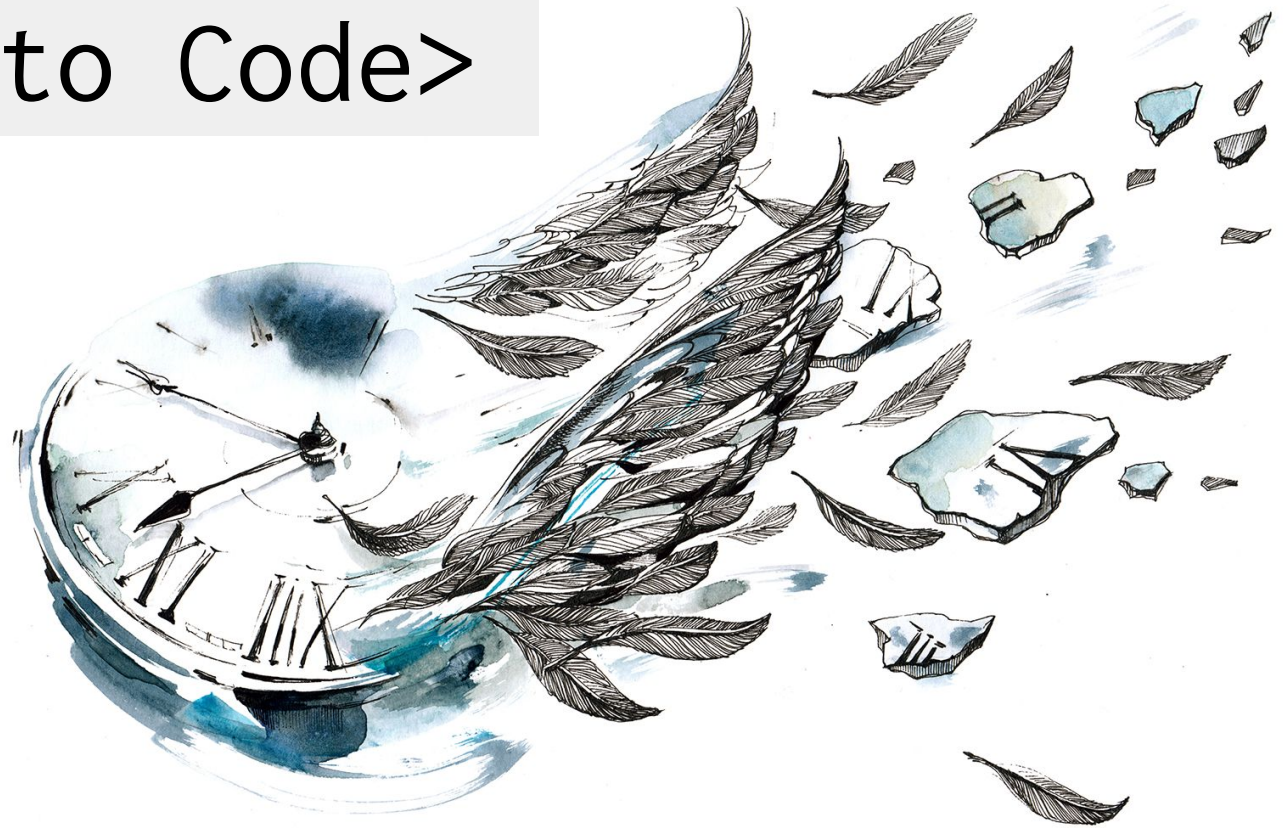
csv reader

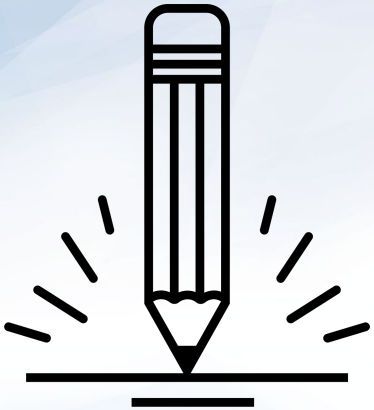
Reading in CSV Files

```
jacob@DESKTOP-0ICJMMD MINGW64 ~/OneDrive/Documents/WorkAndSchool/TeachingAssistant
/DataViz/DataViz-Lesson-Plans/01-Lesson-Plans/03-Python/2/Activities/07-Ins_ReadCS
V (Scramble-Branch)
$ python ReadCSV.py
```

- The code then loops through each row of the CSV and prints out the contents. Make sure to point out how each value is being shown as a string and how all of the rows are lists.

<Time to Code>





Activity: Reading Netflix

In this activity, you will be provided with a CSV file containing data taken from Netflix to create an application which searches through the data for a specific movie/show and returns the name, rating, and review score for it.

Suggested Time:
15 Minutes

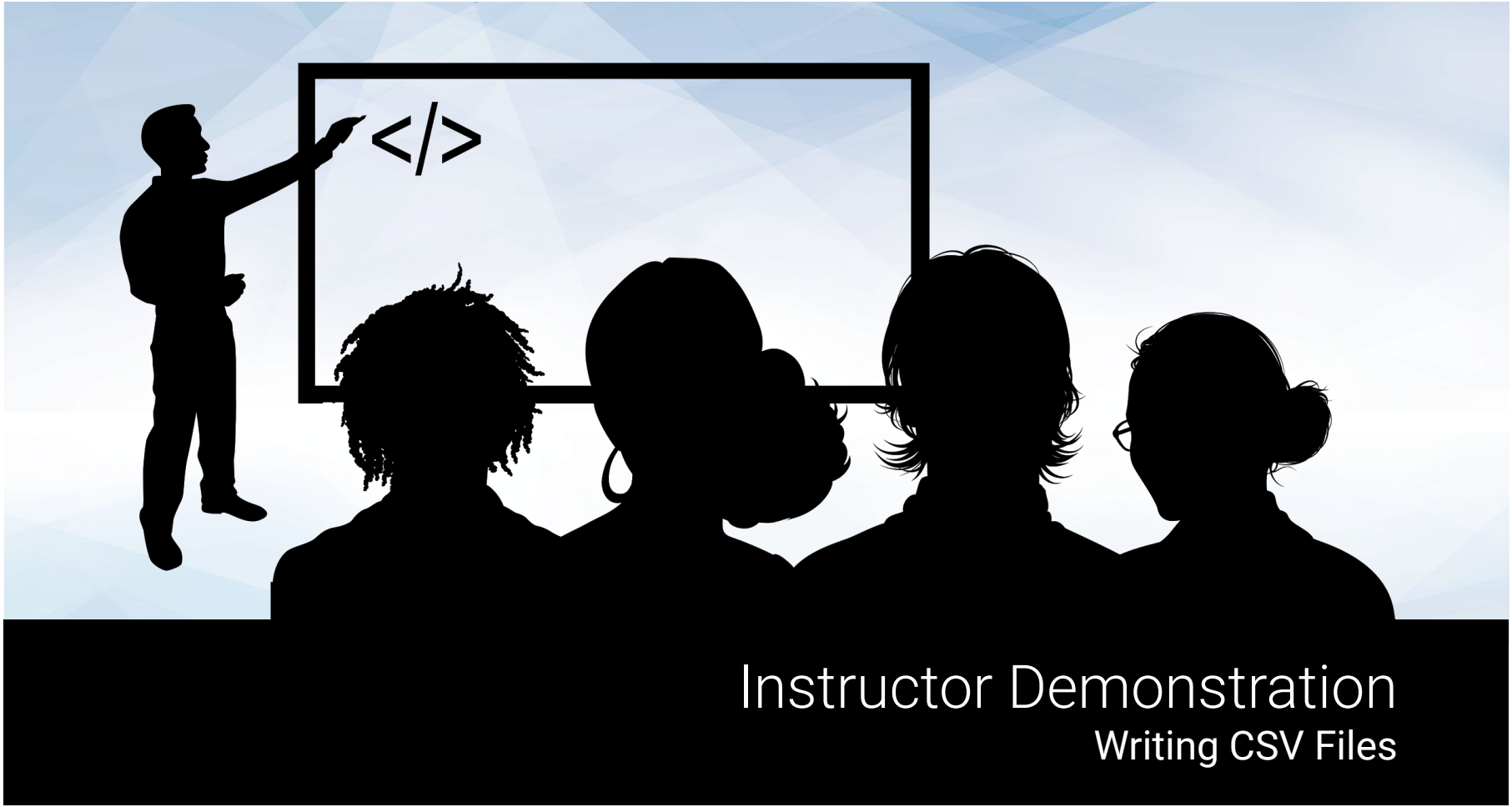
Instructions:

Activity: Reading Netflix

- Prompt the user for what video they are looking for.
- Search through the `netflix_ratings.csv` to find the user's video.
- If the CSV contains the user's video then print out the title, what it is rated and the current user ratings.
    - For example: `‘Grease is rated PG with a rating of 86’`

- **Bonus**:
    - You may have noticed that there is more than one listing for some videos.
    - Edit your code to have the title, the rating and user rating printed out only once.
    - Set a variable to `False` to check if we found the video.
    - In the `for loop` change the variable to confirm that the video is found.
    - Insert a `break` statement into the `for loop` to stop the loop when the first movie is found. Check your Slack for documentation.
    - If the CSV does not contain the user's video then print out a message telling them that their video could not be found

Time’s Up! Let’s Review.



Instructor Demonstration

Writing CSV Files

We all know **Python** can read data in from CSVs. Now, can we also write data to a CSV? Let’s find out!

Writing CSV Files

- `os.path.join(“..”, “output”, “new.csv”)` commands Python the file to write to while assign it to the variable `output_path`.
- `with open(output_path, ‘w’) as csvfile`: is telling Python to open the file using ‘write’ mode while holding the contents in `output_path.`
- `csv.writer()` is telling Python that this application will be writing code into an external CSV file.
- `csv.writerow()` is the code to write a new row into a CSV file.

```python
# Dependencies
import os
import csv

# Specify the file to write to
output_path = os.path.join("..", "output", "new.csv")

# Open the file using "write" mode. Specify the variable to hold the contents
with open(output_path, 'w') as csvfile:

    # Initialize csv.writer
    csvwriter = csv.writer(csvfile, delimiter=',')

    # Write the first row (column headers)
    csvwriter.writerow(['First Name', 'Last Name', 'SSN'])

    # Write the second row
    csvwriter.writerow(['Caleb', 'Frost', '505-80-2901'])
```

Writing CSV Files

- The syntax for writing into a CSV file is thankfully very similar to that used to read data in from an external file.
- First, the code references the path that will point into the CSV file the user would like to write to.
- Next, the `with open()` statement is used once more but with one significant difference. Instead of the parameter `'r'` being passed and directing Python to read a file, the parameter `'w'` is passed instead to inform Python to write to the file.
- Instead of `read.csv()`, `csv.write()` is used to once again inform Python that this application will be writing code into an external CSV file.
- To write a new row into a CSV file, simply use the `csv.writerow(<DATA FILE>)` function and pass in an array of data as the parameter.

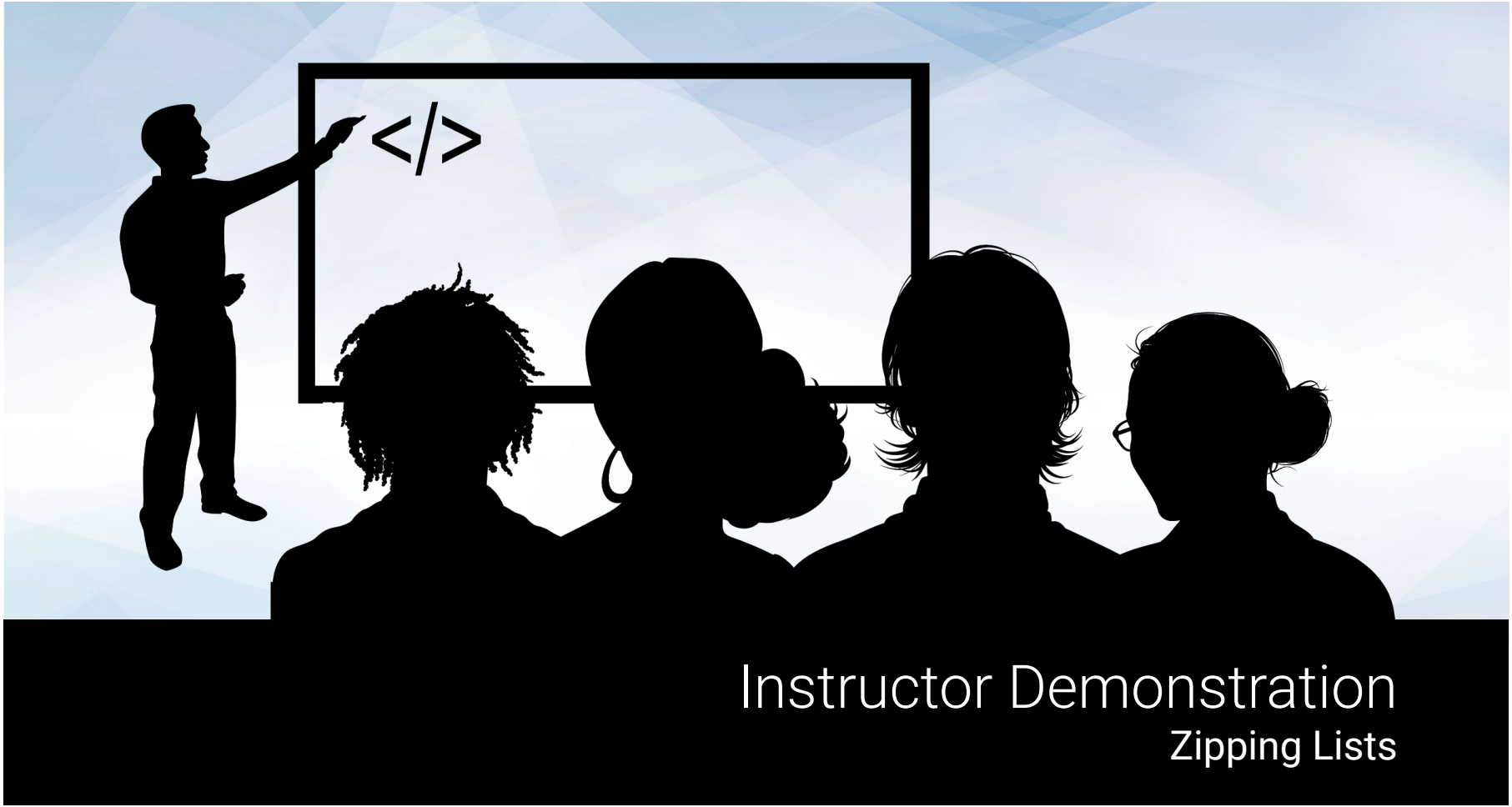
```
# Specify the file to write to
output_path = os.path.join('output', 'new.csv')

# Open the file using "write" mode. Specify the variable to hold the contents
with open(output_path, 'w', newline='') as csvfile:

    # Initialize csv.writer
    csvwriter = csv.writer(csvfile, delimiter=',')

    # Write the first row (column headers)
    csvwriter.writerow(['First Name', 'Last Name', 'SSN'])

    # Write the second row
    csvwriter.writerow(['Caleb', 'Frost', '505-80-2901'])
```



Instructor Demonstration

Zipping Lists

Python users can be far more efficiently write data into a new CSV file by using the `zip()` function.

Zipping Lists

- `zip()` takes in a series of lists as its parameters and joins them together into a stack.

- By zipping these lists together, there is now a single joined list whose indexes reference all three of the lists inside.
- Each zipped object can only be used once. For example, you can write the zipped object to a CSV or print to the terminal, but not both.

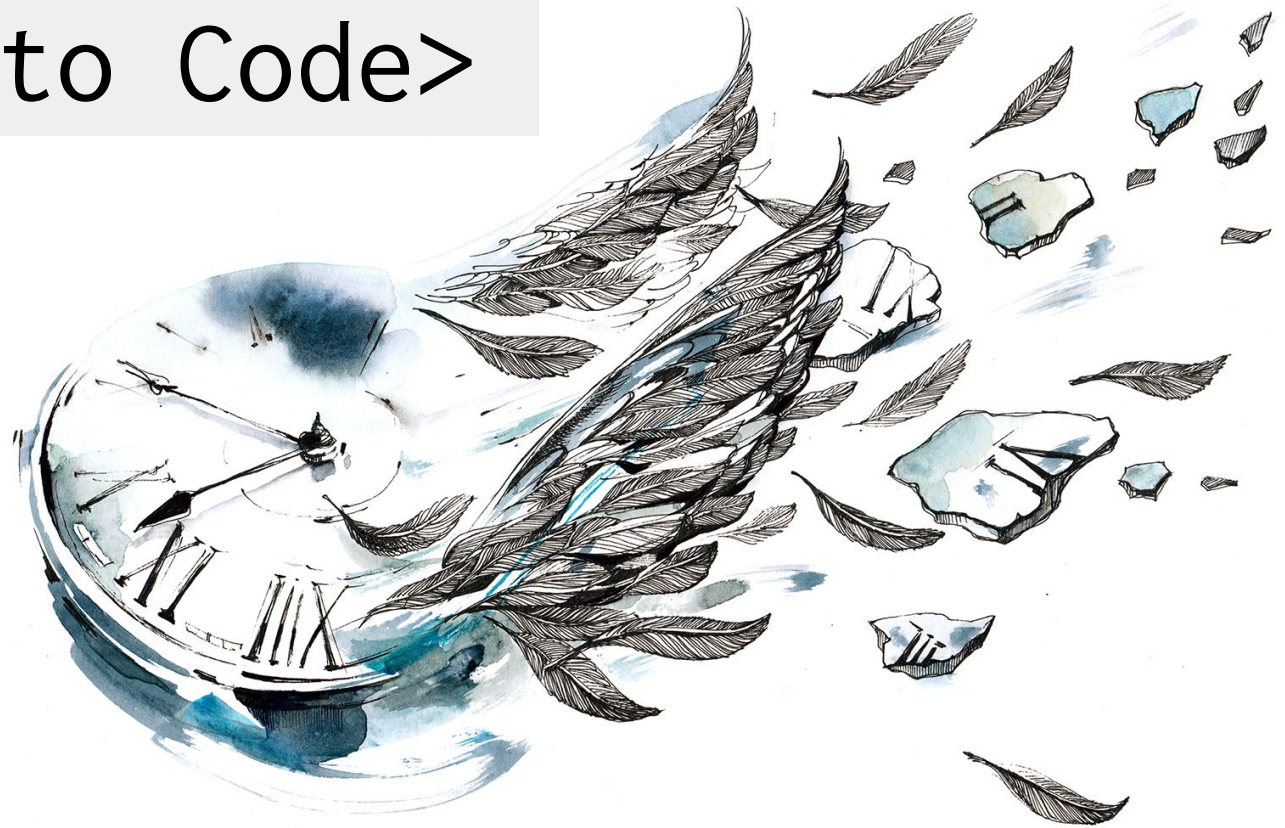
```
$ python zipper.py
(1, 'Michael', 'Boss')
(2, 'Dwight', 'Sales')
(3, 'Meredith', 'Sales')
(4, 'Kelly', 'HR')
```

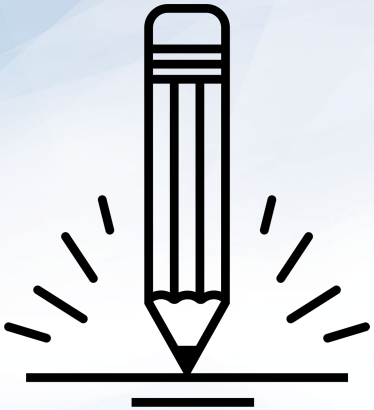
```
# Three Lists
indexes = [1, 2, 3, 4]
employees = ["Michael", "Dwight", "Meredith", "Kelly"]
department = ["Boss", "Sales", "Sales", "HR"]

# Zip all three lists together into tuples
roster = zip(indexes, employees, department)

# Print the contents of each row
for employee in roster:
    print(employee)
```

<Time to Code>





Activity: Udemy Zip

In this activity, you will be provided with a large dataset from Udemy, clean up, and create CSV file that is far easier to comprehend.

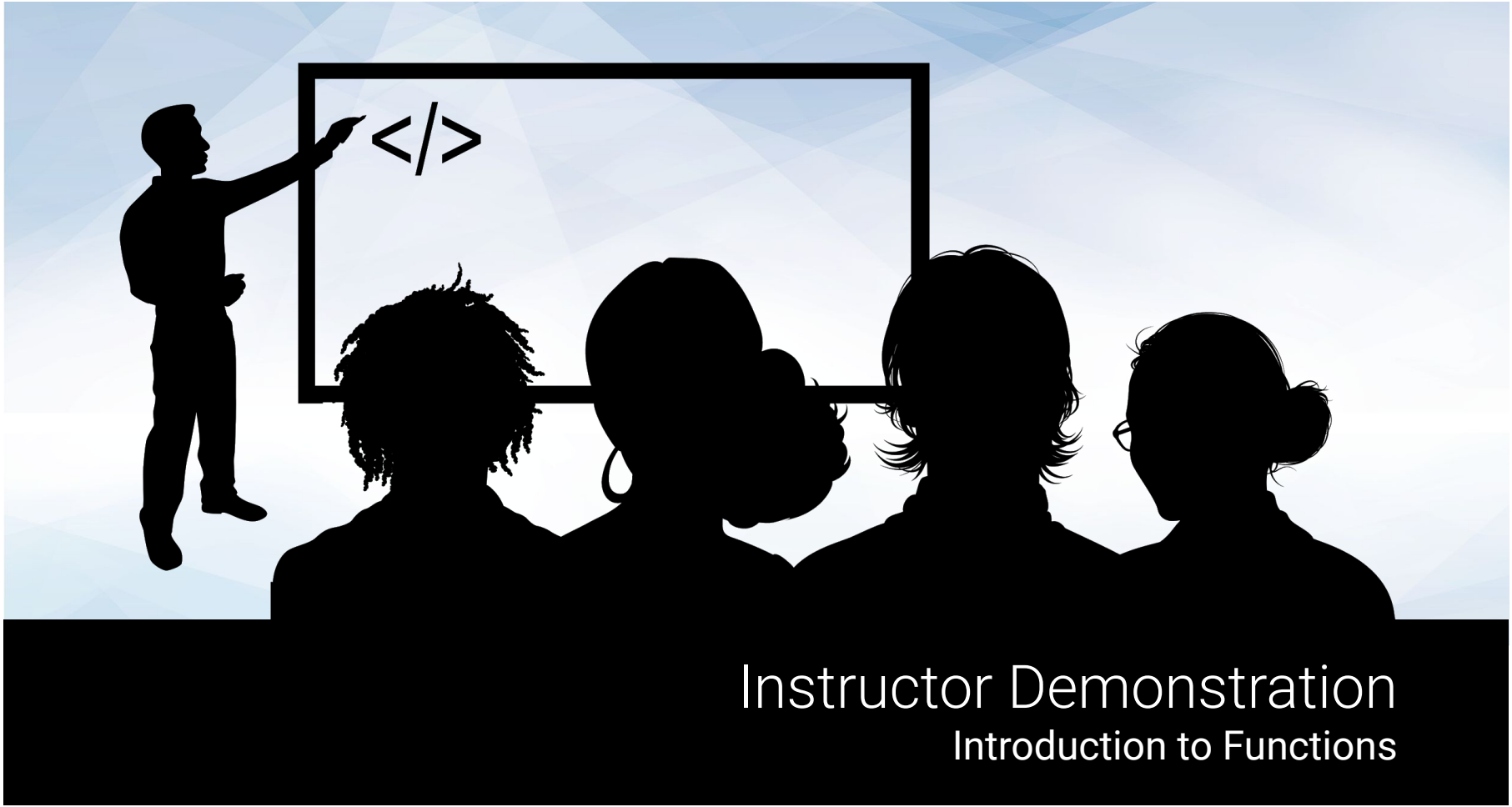
Suggested Time:
20 Minutes

Instructions:

Activity: Udemy Zip

- Create a Python application that reads the data on Udemy Web Development offerings.
- Then store the contents of the Title, Price, Subscriber Count, Number of Reviews, and Course Length into Python Lists.
- Then zip these lists together into a single tuple.
- Finally, write the contents of your extracted data into a CSV. Make sure to include the titles of these columns in your CSV.
- **Notes:**
  - As, with many datasets, the file does not include the header line. Use the below as a guide on the columns: "id, title, url, isPaid, price, numSubscribers, numReviews, numPublishedLectures, instructionalLevel, contentInfo, publishedTime"
- **Bonus:**
  - Find the percent of subscribers that have also left a review on the course. Include this in your final output.
  - Parse the string associated with course length, such that we store it as an integer instead of a string. (i.e. "4 hours" should be converted to 4).

Time’s Up! Let’s Review.



Instructor Demonstration

Introduction to Functions

DRY - It stands for **D**on’t **R**epeat **Y**ourself. It is a very popular acronym among the tech community, and many coders live by it.

Introduction to Functions

Preventing repetition by liberal usage of Python functions.

- A function is a block of organized, reusable code that is used to perform a single, related action. In other words, functions are placeable blocks of code that perform a specific action.
- To create a new function, simply use `def <FUNCTION NAME>():` and then place the code that you would like to run within the block underneath it.
- In order to run the code stored within a function, the function itself must be called within the program. Functions will never run unless called upon.
- Functions that take in parameters can also be created by simply adding a variable into the parentheses of the function's definition. This allows specific data to be passed into the function for usage.

```
def print_hello():
  print(f"Hello!")

print_hello()
```

```
def print_name(name):
    print("Hello " + name + "!")

print_name("Bob Smith")
```


The End