

Reference guide: Python concepts from Course 7

Google Cybersecurity Certificate

Comments

The following syntax is used to create a comment. (A comment is a note programmers make about the intention behind their code.)

#

Starts a line that contains a Python comment

```
# Print approved usernames
```

Contains a comment that indicates the purpose of the code that follows it is to print approved usernames

""" (documentation strings)

Starts and ends a multi-line string that is often used as a Python comment; multi-line comments are used when you need more than 79 characters in a single comment

```
"""
```

```
The estimate_attempts() function takes in a monthly  
login attempt total and a number of months and  
returns their product.
```

```
"""
```

Contains a multi-line comment that indicates the purpose of the `estimate_attempts()` function

Conditional statements

The following keywords and operators are used in conditional statements.

if

Starts a conditional statement

```
if device_id != "la858zn":
```

Starts a conditional statement that evaluates whether the `device_id` variable contains a value that is not equal to "la858zn"

```
if user in approved_list:
```

Starts a conditional statement that evaluates if the `user` variable contains a value that is also found in the `approved_list` variable

elif

Precedes a condition that is only evaluated when previous conditions evaluate to `False`; previous conditions include the condition in the `if` statement, and when applicable, conditions in other `elif` statements

```
elif status == 500:
```

When previous conditions evaluate to `False`, evaluates if the `status` variable contains a value that is equal to 500

else

Precedes a code section that only evaluates when all conditions that precede it within the conditional statement evaluate to `False`; this includes the condition in the `if` statement, and when applicable, conditions in `elif` statements

```
else:
```

When previous conditions evaluate to `False`, Python evaluates this `else` statement

and

Requires both conditions on either side of the operator to evaluate to `True`

```
if username == "bmoreno" and login_attempts < 5:
```

Evaluates to `True` if the value in the `username` variable is equal to "bmoreno" and the value in the `login_attempts` variable is less than 5

or

Requires only one of the conditions on either side of the operator to evaluate to `True`

```
if status == 100 or status == 102:
```

Evaluates to `True` if the value in the `status` variable is equal to `100` or the value in the `status` variable is equal to `102`

not

Negates a given condition so that it evaluates to `False` if the condition is `True` and to `True` if it is `False`

```
if not account_status == "removed"
```

Evaluates to `False` if the value in the `account_status` variable is equal to `"removed"` and evaluates to `True` if the value in the `account_status` variable is not equal to `"removed"`

Iterative statements

The following keywords are used in iterative statements.

for

Signals the beginning of a `for` loop; used to iterate through a specified sequence

```
for username in ["bmoreno", "tshah", "elarson"]:
```

Signals the beginning of a `for` loop that iterates through the sequence of elements in the list `["bmoreno", "tshah", "elarson"]` using the loop variable `username`

```
for i in range(10):
```

Signals the beginning of a `for` loop that iterates through a sequence of numbers created by `range(10)` using the loop variable `i`

while

Signals the beginning of a `while` loop; used to iterate based on a condition

```
while login_attempts < 5:
```

Signals the beginning of a `while` loop that will iterate as long as the condition that the value of `login_attempts` is less than 5 evaluates to `True`

break

Used to break out of a loop

continue

Used to skip a loop iteration and continue with the next one

User-defined functions

The following keywords are used when creating user-defined functions.

def

Placed before a function name to define a function

```
def greet_employee():
```

Defines the `greet_employee()` function

```
def calculate_fails(total_attempts, failed_attempts):
```

Defines the `calculate_fails()` function, which includes the two parameters of `total_attempts` and `failed_attempts`

return

Used to return information from a function; when Python encounters this keyword, it exits the function after returning the information

```
def calculate_fails(total_attempts, failed_attempts):  
    fail_percentage = failed_attempts / total_attempts  
    return fail_percentage
```

Returns the value of the `fail_percentage` variable from the `calculate_fails()` function

Built-in functions

The following built-in functions are commonly used in Python.

print()

Outputs a specified object to the screen

```
print("login success")
```

Outputs the string "login success" to the screen

```
print(9 < 7)
```

Outputs the Boolean value of `False` to the screen after evaluating whether the integer 9 is less than the integer 7

type()

Returns the data type of its input

```
print(type(51.1))
```

Returns the data type of float for the input of 51.1

```
print(type(True))
```

Returns the data type of Boolean for the input of True

range()

Generates a sequence of numbers

```
range(0, 5, 1)
```

Generates a sequence with a start point of 0, a stop point of 5, and an increment of 1; because the start point is inclusive but the stop point is exclusive, the generated sequence is 0, 1, 2, 3, and 4

```
range(5)
```

Generates a sequence with a stop point of 5; when the start point is not specified, it is set at the default value of 0, and when the increment is not specified, it is set at the default value of 1; the generated sequence is 0, 1, 2, 3, and 4

max()

Returns the largest numeric input passed into it

```
print(max(10, 15, 5))
```

Returns 15 and outputs this value to the screen

min()

Returns the smallest numeric input passed into it

```
print(min(10, 15, 5))
```

Returns 5 and outputs this value to the screen

sorted()

Sorts the components of a list (or other iterable)

```
print(sorted([10, 15, 5]))
```

Sorts the elements of the list from smallest to largest and outputs the sorted list of [5, 10, 15] to the screen

```
print(sorted(["bmoreno", "tshah", "elarson"]))
```

Sorts the elements in the list in alphabetical order and outputs the sorted list of ["bmoreno", "elarson", "tshah"] to the screen

str()

Converts the input object to a string

```
str(10)
```

Converts the integer 10 to the string "10"

len()

Returns the number of elements in an object

```
print(len("security"))
```

Returns and displays 8, the number of characters in the string "security"

Importing modules and libraries

The following keyword is used to import a module from the Python Standard Library or to import an external library that has already been installed.

import

Searches for a module or library in a system and adds it to the local Python environment

```
import statistics
```

Imports the `statistics` module and all of its functions from the Python Standard Library

```
from statistics import mean
```

Imports the `mean()` function of the `statistics` module from the Python Standard Library

```
from statistics import mean, median
```

Imports the `mean()` and `median()` functions of the `statistics` module from the Python Standard Library

String methods

The following methods can be applied to strings in Python.

.upper()

Returns a copy of the string in all uppercase letters

```
print("Security".upper())
```

Returns and displays a copy of the string "Security" as "SECURITY"

.lower()

Returns a copy of the string in all lowercase letters

```
print("Security".lower())
```

Returns and displays a copy of the string "Security" as "security"

.index()

Finds the first occurrence of the input in a string and returns its location

```
print("Security".index("c"))
```

Finds the first occurrence of the character "c" in the string "Security" and returns and displays its index of 2

List methods

The following methods can be applied to lists in Python.

.insert()

Adds an element in a specific position inside the list

```
username_list = ["elarson", "fgarcia", "tshah"]  
username_list.insert(2, "wjaffrey")
```

Adds the element "wjaffrey" at index 2 to the `username_list`; the list becomes ["elarson", "fgarcia", "wjaffrey", "tshah"]

.remove()

Removes the first occurrence of a specific element inside a list

```
username_list = ["elarson", "bmoreno", "wjaffrey", "tshah"]
username_list.remove("elarson")
```

Removes the element "elarson" from the username_list; the list becomes ["fgarcia", "wjaffrey", "tshah"]

.append()

Adds input to the end of a list

```
username_list = ["bmoreno", "wjaffrey", "tshah"]
username_list.append("btang")
```

Adds the element "btang" to the end of the username_list; the list becomes ["fgarcia", "wjaffrey", "tshah", "btang"]

.index()

Finds the first occurrence of an element in a list and returns its index

```
username_list = ["bmoreno", "wjaffrey", "tshah", "btang"]
print(username_list.index("tshah"))
```

Finds the first occurrence of the element "tshah" in the username_list and returns and displays its index of 2

Additional syntax for working with strings and lists

The following syntax is useful when working with strings and lists.

+ (concatenation)

Combines two strings or lists together

```
device_id = "IT"+"nwp12"
```

Combines the string "IT" with the string "nwp12" and assigns the combined string of "ITnwp12" to the variable device_id

```
users = ["elarson", "bmoreno"] + ["tshah", "btang"]
```

Combines the list ["elarson", "bmoreno"] with the list ["tshah", "btang"] and assigns the combined list of ["elarson", "bmoreno", "tshah", "btang"] to the variable users

[] (bracket notation)

Uses indices to extract parts of a string or list


```
print("h32rb17"[0])
```

Extracts the character at index 0, which is ("h"), from the string "h32rb17"

```
print("h32rb17"[0:3])
```

Extracts the slice [0:3], which is ("h32"), from the string "h32rb17"; the first index in the slice (0) is included in the slice but the second index in the slice (3) is excluded

```
username_list = ["elarson", "fgarcia", "tshah"]
```

```
print(username_list[2])
```

Extracts the element at index 2, which is ("tshah"), from the username_list

Regular expressions

The following `re` module function and regular expression symbols are useful when searching for patterns in strings.

re.findall()

Returns a list of matches to a regular expression

```
import re
```

```
re.findall("a53", "a53-32c .E")
```

Returns a list of matches to the regular expression pattern "a53" in the string "a53-32c .E"; returns the list ["a53"]

\w

Matches with any alphanumeric character; also matches with the underscore (`_`)

```
import re
```

```
re.findall("\w", "a53-32c .E")
```

Returns a list of matches to the regular expression pattern "\w" in the string "a53-32c .E"; matches to any alphanumeric character and returns the list ["a", "5", "3", "3", "2", "c", "E"]

.

Matches to all characters, including symbols

```
import re
```

```
re.findall(".", "a53-32c .E")
```

Returns a list of matches to the regular expression pattern "." in the string "a53-32c .E"; matches to all characters and returns the list ["a", "5", "3", "-", "3", "2", "c", " ", ".", "E"]

\d

Matches to all single digits

```
import re
re.findall("\d", "a53-32c .E")
```

Returns a list of matches to the regular expression pattern "\d" in the string "a53-32c .E"; matches to all single digits and returns the list ["5", "3", "3", "2"]

\s

Matches to all single spaces

```
import re
re.findall("\d", "a53-32c .E")
```

Returns a list of matches to the regular expression pattern "\s" in the string "a53-32c .E"; matches to all single spaces and returns the list [" "]

\.

Matches to the period character

```
import re
re.findall("\.", "a53-32c .E")
```

Returns a list of matches to the regular expression pattern "\." in the string "a53-32c .E"; matches to all instances of the period character and returns the list ["."]

+

Represents one or more occurrences of a specific character

```
import re
re.findall("\w+", "a53-32c .E")
```

Returns a list of matches to the regular expression pattern "\w+" in the string "a53-32c .E"; matches to one or more occurrences of any alphanumeric character and returns the list ["a53", "32c", "E"]

Represents, zero, one or more occurrences of a specific character

```
import re
re.findall("\w*", "a53-32c .E")
```

Returns a list of matches to the regular expression pattern "\w*" in the string "a53-32c .E"; matches to zero, one or more occurrences of any alphanumeric character and returns the list ["a53", " ", "32c", " ", " ", "E"]

{ }

Represents a specified number of occurrences of a specific character; the number is specified within the curly brackets

```
import re
re.findall("\w{3}", "a53-32c .E")
```

Returns a list of matches to the regular expression pattern "\w{3}" in the string "a53-32c .E"; matches to exactly three occurrences of any alphanumeric character and returns the list ["a53", "32c"]

File operations

The following functions, methods, and keywords are used with operations involving files.

with

Handles errors and manages external resources

```
with open("logs.txt", "r") as file:
```

Used to handle errors and manage external resources while opening a file; the variable `file` stores the file information while inside of the `with` statement; manages resources by closing the file after exiting the `with` statement

open()

Opens a file in Python

```
with open("login_attempts.txt", "r") as file:
```

Opens the file "login_attempts.txt" in order to read it ("r")

```
with open("update_log.txt", "w") as file:
```

Opens the file "update_log.txt" into the variable `file` in order to write over its contents ("w")

```
with open(import_file, "a") as file:
```

Opens the file assigned to the `import_file` variable into the variable `file` in order to append information to the end of it ("a")

as

Assigns a variable that references another object

```
with open("logs.txt", "r") as file:
```

Assigns the `file` variable to reference the output of the `open()` function

.read()

Converts files into strings; returns the content of an open file as a string by default

```
with open("login_attempts.txt", "r") as file:  
    file_text = file.read()
```

Converts the file object referenced in the `file` variable into a string and then stores this string in the `file_text` variable

.write()

Writes string data to a specified file

```
with open("access_log.txt", "a") as file:  
    file.write("jrafael")
```

Writes the string "jrafael" to the "access_log.txt" file; because the second argument in the call to the `open()` function is "a", this string is appended to the end of the file

Parsing

The following methods are useful when parsing data.

.split()

Converts a string into a list; separates the string based on the character that is passed in as an argument; if an argument is not passed in, it will separate the string each time it encounters whitespace characters such as a space or return

```
approved_users = "elarson,bmoreno,tshah".split(",")
```

Converts the string "elarson,bmoreno,tshah" into the list

["elarson", "bmoreno", "tshah"] by splitting the string into a separate list element at

each occurrence of the " , " character

```
removed_users = "wjaffrey jsoto abernard".split()
```

Converts the string "wjaffrey jsoto abernard" into the list

["wjaffrey", "jsoto", "abernard"] by splitting the string into a separate list element at each space

.join()

Concatenates the elements of an iterable into a string; takes the iterable to be concatenated as an argument; is appended to a character that will separate each element once they are joined into a string

```
approved_users = ",".join(["elarson", "bmoreno", "tshah"])
```

Concatenates the elements of the list ["elarson", "bmoreno", "tshah"] into the string "elarson,bmoreno,tshah", separating each element with the " , " character within the string

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