

# Activity: Debug Python Code

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## Introduction

One of the biggest challenges faced by analysts is ensuring that automated processes run smoothly. Debugging is an important practice that security analysts incorporate in their work to identify errors in code and resolve them so that the code achieves the desired outcome.

Through a series of tasks in this lab, you'll develop and apply your debugging skills in Python.

## Scenario

In your work as a security analyst, you need to apply debugging strategies to ensure your code works properly.

Throughout this lab, you'll work with code that is similar to what you've written before, but now it has some errors that need to be fixed. You'll need to read code cells, run them, identify the errors, and adjust the code to resolve the errors.

## Task 1

The following code cell contains a syntax error. In this task, you'll run the code, identify why the error is occurring, and modify the code to resolve it. (To ensure that it has been resolved, run the code again to check if it now functions properly.)

```
# For loop that iterates over a range of numbers  
# and displays a message each iteration
```

```
for i in range(10):  
    print("Connection cannot be established")
```

```
File "<ipython-input-1-324a3968fb71>", line 4
```

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

^

```
SyntaxError: invalid syntax
```

### Question 1

**What happens when you run the code before modifying it? How can you fix this?**

File "", line 4 for i in range(10) ^ SyntaxError: invalid syntax

To fix this, I added a colon after the "for" loop declaration.

## Task 2

In the following code cell, you're provided a list of usernames. There is an issue with the syntax. In this task, you'll run the cell, observe what happens, and modify the code to fix the issue.

```
# Assign `usernames_list` to a list of usernames

usernames_list = ["djames", "jpark", "tbailey", "zdutchma", "esmith",
                  "srobinso", "dcoleman", "fbautist"]

# Display `usernames_list`

print(usernames_list)
```

File "<ipython-input-2-8a568c7729fd>", line 3  
usernames\_list = ["djames", "jpark", "tbailey", "zdutchma",  
"esmith", "srobinso", "dcoleman", "fbautist"]  
^  
SyntaxError: invalid syntax

### Question 2

**What happens when you run the code before modifying it? How can you fix it?**

File "", line 3 usernames\_list = ["djames", "jpark", "tbailey", "zdutchma", "esmith", "srobinso", "dcoleman", "fbautist"] ^ SyntaxError: invalid syntax

To fix this, I added the missing quotation mark and comma to separate the two usernames.

## Task 3

In the following code cell, there is a syntax error. Your task is to run the cell, identify what is causing the error, and fix it.

```
# Display a message in upper case

print("update needed".upper())

UPDATE NEEDED
```

### Question 3

**What happens when you run the code before modifying it? What is causing the syntax error? How can you fix it?**

File "", line 3 print("update needed".upper()) ^ SyntaxError: unexpected EOF while parsing

To fix this, I added the missing closing parenthesis.

## Task 4

In the following code cell, you're provided a `usernames_list`, a `username`, and code that determines whether the username is approved. There are two syntax errors and one exception. Your task is to find them and fix the code. A helpful debugging strategy is to focus on one error at a time and run the code after fixing each one.

```
# Assign `usernames_list` to a list of usernames that represent approved users

usernames_list = ["djames", "jpark", "tbailey", "zdutchma", "esmith", "srobinso", "dcoleman", "fbautist"]

# Assign `username` to a specific username

username = "esmith"

# For loop that iterates over the elements of `usernames_list` and determines whether each element corresponds to an approved user

for name in usernames_list:

    # Check if `name` matches `username`
    # If it does match, then display a message accordingly

    if name == username:
        print("The user is an approved user")

The user is an approved user
```

### Question 4

**What happens when you run the code before modifying it? What is causing the errors? How can you fix it?**

There are two syntax errors, and an exception. The fixes were: (1) adding a second "=" sign for a variable comparison, (2) indenting the "if" statement block, and (3) changing the variable "username\_list" to match "usernames\_list".

## Task 5

In this task, you'll examine the following code and identify the type of error that occurs. Then, you'll adjust the code to fix the error.

```
# Assign `usernames_list` to a list of usernames

usernames_list = ["elarson", "bmoreno", "tshah", "sgilmore", "eraab"]

# Assign `username` to a specific username
```

```

username = "eraab"

# Determine whether `username` is the final username in
`usernames_list`
# If it is, then display a message accordingly

if username == usernames_list[4]:
    print("This username is the final one in the list.")
-----
-----
IndexError                                Traceback (most recent call
last)
<ipython-input-10-dd58b4c6c2be> in <module>
      10 # If it is, then display a message accordingly
      11
--> 12 if username == usernames_list[5]:
      13     print("This username is the final one in the list.")

IndexError: list index out of range

```

## Question 5

**What happens when you run the code before modifying it? What type of error is this? How can you fix it?**

```

IndexError Traceback (most recent call last) in 10 # If it is, then display a message accordingly 11
--> 12 if username == usernames_list[5]: 13 print("This username is the final one in the list.")

```

IndexError: list index out of range

The index was wrong, this is an IndexError. Instead of searching for the 5th list element, the index was literally "5" instead of "4".

## Task 6

In this task, you'll examine the following code. The code imports a text file into Python, reads its contents, and stores the contents as a list in a variable named `ip_addresses`. It then removes elements from `ip_addresses` if they are in `remove_list`. There are two errors in the code: first a syntax error and then an exception related to a string method. Your goal is to find these errors and fix them.

```

# Assign `import_file` to the name of the text file

import_file = "allow_list.txt"

# Assign `remove_list` to a list of IP addressess that are no longer
allowed to access the network

remove_list = ["192.168.97.225", "192.168.158.170", "192.168.201.40",

```

```

"192.168.58.57"]

# With statement that reads in the text file and stores its contents
as a list in `ip_addresses`

with open(import_file, "r") as file:
    ip_addresses = file.read()

# Convert `ip_addresses` from a string to a list

ip_addresses = ip_addresses.split()

# For loop that iterates over the elements in `remove_list`,
# checks if each element is in `ip_addresses`,
# and removes each element that corresponds to an IP address that is
no longer allowed

for element in remove_list:
    if element in ip_addresses:
        ip_addresses.remove(element)

# Display `ip_addresses` after the removal process

print(ip_addresses)

['ip_address', '192.168.25.60', '192.168.205.12', '192.168.6.9',
'192.168.52.90', '192.168.90.124', '192.168.186.176',
'192.168.133.188', '192.168.203.198', '192.168.218.219',
'192.168.52.37', '192.168.156.224', '192.168.60.153',
'192.168.69.116']

```

## Question 6

**What happens when you run the code before modifying it? What is causing the errors? How can you fix them?**

The first problem was the "open" statement to read the file was missing a colon. The second was an exception, where the ".split()" function was used improperly. I fixed it by changing "split.ip\_addresses()" to "ip\_addresses.split()".

## Task 7

In this final task, there are three operating systems: OS 1, OS 2, and OS 3. Each operating system needs a security patch by a specific date. The patch date for OS 1 is "March 1st", the patch date for OS 2 is "April 1st", and the patch date for OS 3 is "May 1st".

The following code stores one of these operating systems in a variable named `system`. Then, it uses conditionals to output the patch date for this operating system.

However, this code has logic errors. Your goal is to assign the `system` variable to different values, run the code to examine the output, identify the error, and fix it.

```
# Assign `system` to a specific operating system as a string
system = "OS 2"

# Assign `patch_schedule` to a list of patch dates in order of
operating system

patch_schedule = ["March 1st", "April 1st", "May 1st"]

# Conditional statement that checks which operating system is stored
in `system` and displays a message showing the corresponding patch
date

if system == "OS 1":
    print("Patch date:", patch_schedule[0])
elif system == "OS 2":
    print("Patch date:", patch_schedule[1])
elif system == "OS 3":
    print("Patch date:", patch_schedule[2])

Patch date: April 1st
```

## Question 7

What happens when you run the code before modifying it? What is causing the logic errors?  
How can you fix them?

## Conclusion

What are your key takeaways from this lab?

Errors in code can mess up the entire function and purpose of the code.