SI 506: Programming I

Fall 2019

Lecture 16

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preliminaries

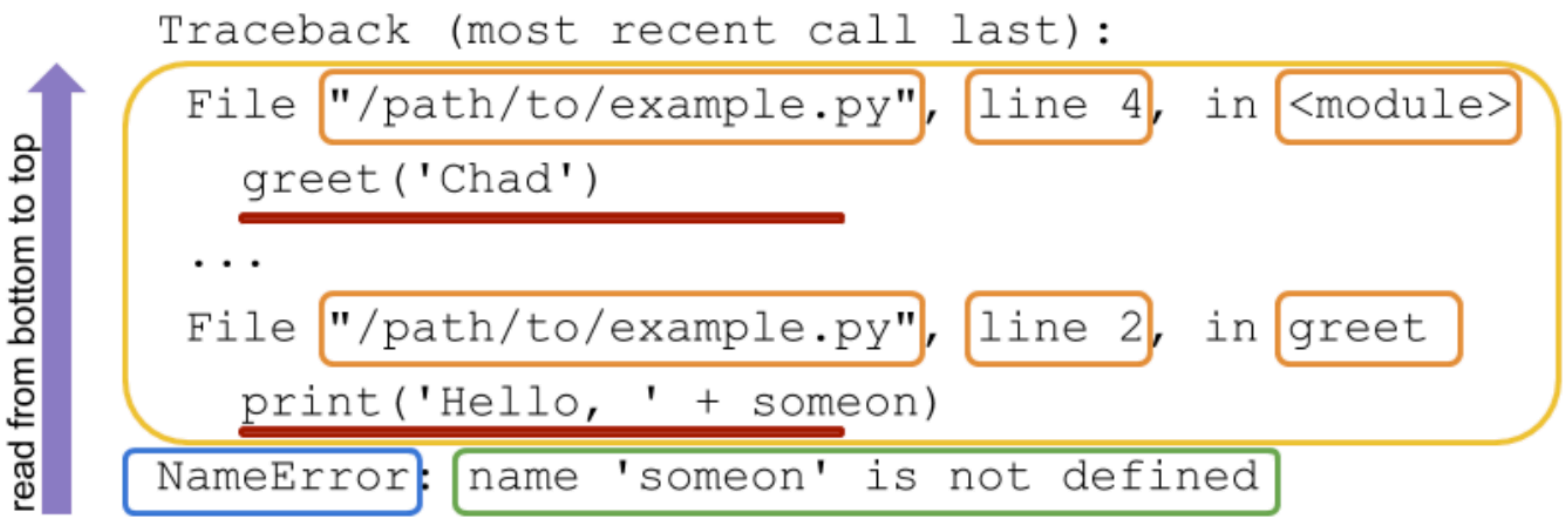
Exercise

paths

```
lectures/lecture_16/
    lecture_16_exercise.py
    scary_films.json
```

scary films exercise

Exceptions
traceback horror



```
Traceback (most recent call last):
  File "/path/to/example.py", line 4, in <module>
    greet('Chad')
  ...
  File "/path/to/example.py", line 2, in greet
    print('Hello, ' + someon)
NameError: name 'someon' is not defined
```

Source: https://realpython.com/python-traceback/

It: Chapter One (2017)

scary clown

It: Chapter One (2017)

scary movie, scary clown

```
it = {}
it['title'] = 'It: Chapter One'
it['year_released'] = 2017
it['budget'] = 35000000
it['box_office'] = 700000000
it['scary_character'] = {}. # nested dictionary
it['scary_character']['name'] = 'Pennywise the Dancing Clown'
it['scary_character']['signature_weapon'] = None
```

UMSI

Friday the 13th (1980)

scary hockey mask

Friday the 13th (1980)

scary movie, scary hockey mask

```
friday_13th = {
    'title': 'Friday the 13th',
    'year_released': 1980,
    'budget': 5500000,
    'box_office': 59800000,
    'scary_character': {
        'name': 'Jason Vorhees',
        'signature_weapon': 'machete'
    }
}
```

JSON

Javascript Object Notation (data interchange format)

```
{
    "scary_films": [
      {
        "title": "The Wizard of Oz",
        "year_released": 1939,
        "budget": 2800000,
        "box_office": 26100000,
        "scary_character": {
            "name": "The Wicked Witch of the West",
            "signature_weapon": "evil spells"
        }
      }
    ]
}
```

↑

nested object {}

Read a JSON file

use json module

```python
import json # a treat


def read_scary_data(filename):
    """Get JSON"""
    with open(filename, 'r') as scary_file_obj:
        data = json.load(scary_file_obj) # a trick

    return data

scary_file = 'scary_films.json'
scary_source_data = read_scary_data(scary_file)
```

Write to a JSON file

use json module

```python
import json # a treat

def write_scary_data(filename, data):
    """Write dictionary to JSON file"""
    with open(filename, 'w') as scary_file_obj:
        json.dump(data, scary_file_obj, indent=4)

filename = 'scary_characters.json'
write_scary_data(filename, scary_output_data)
```

Utility functions

return dictionary, return string

```
def get_scary_film_character(film):
    """Return dictionary object."""
    return film['scary_character']


def get_scary_film_character_name(film):
    """Return scary character name."""
    character = get_scary_film_character(film)

    return character['name']
```

Utility functions

check films list for film

```python
def has_film_credit(films, title):
    """Check if film is in the films list."""
    if films:
        for film in films:
            if film['title'] == title:
                return True

    return False
```

Utility functions

add film credits to scary character

```
def add_film_credits_to_scary_characters(characters, films):
    """Add scary character film credits."""
    for character in characters:
        character.setdefault('films', [])  # add property if missing
        for film in films:

            if character['name'] == film['scary_character']['name'] \
               and not has_film_credit(character['films'], film['title']):

                character['films'].append({
                    'title': film['title'],
                    'year_released': film['year_released'],
                    'budget': film['budget'],
                    'box_office': film['box_office'],
                })

    return characters
```

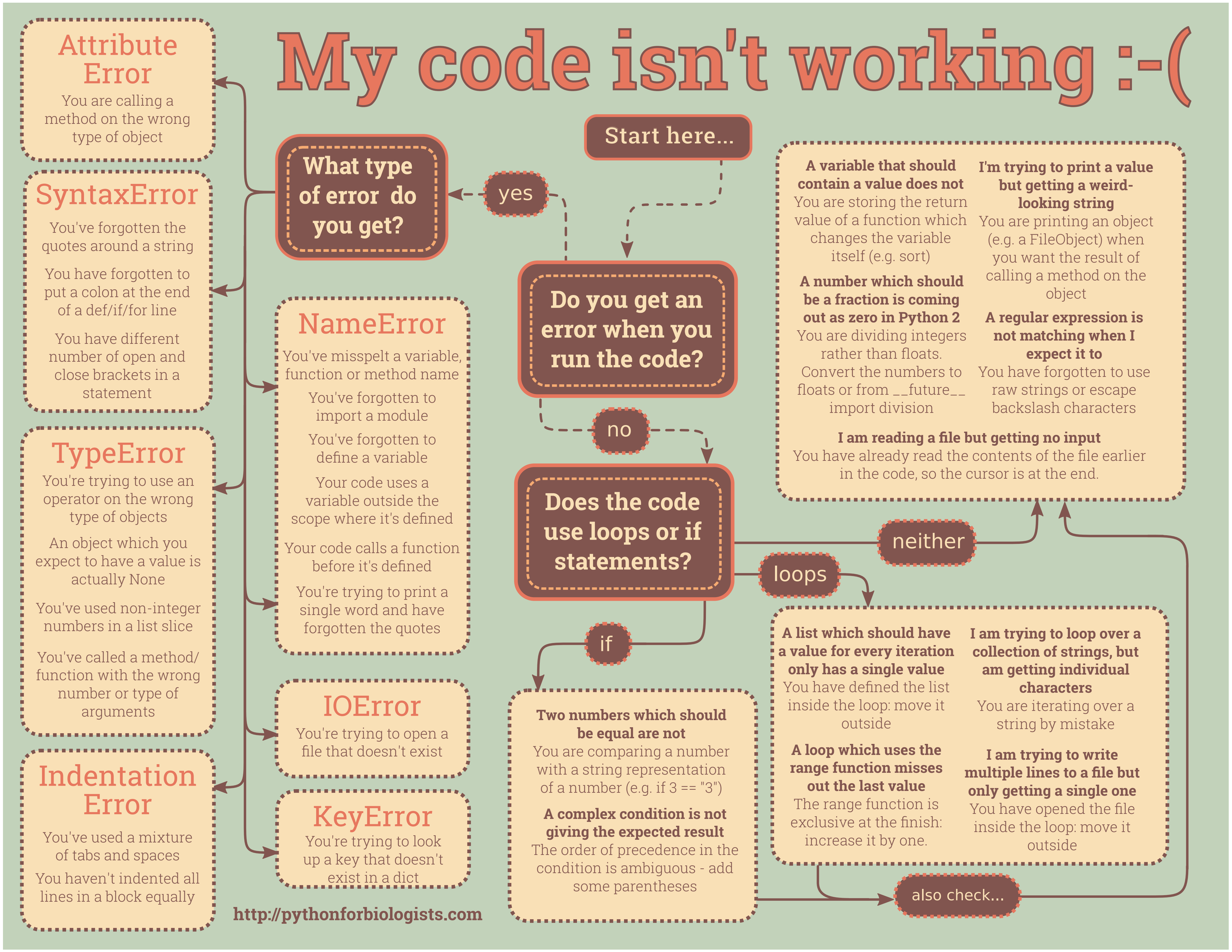
start exercise

finis

directors cut

When your code misbehaves

debug flowchart



My code isn't working :-(

Start here...

Do you get an error when you run the code?

yes → **What type of error do you get?**

Attribute Error
You are calling a method on the wrong type of object

SyntaxError
You've forgotten the quotes around a string
You have forgotten to put a colon at the end of a def/if/for line
You have different number of open and close brackets in a statement

TypeError
You're trying to use an operator on the wrong type of objects
An object which you expect to have a value is actually None
You've used non-integer numbers in a list slice
You've called a method/ function with the wrong number or type of arguments

Indentation Error
You've used a mixture of tabs and spaces
You haven't indented all lines in a block equally

NameError
You've misspelt a variable, function or method name
You've forgotten to import a module
You've forgotten to define a variable
Your code uses a variable outside the scope where it's defined
Your code calls a function before it's defined
You're trying to print a single word and have forgotten the quotes

IOError
You're trying to open a file that doesn't exist

KeyError
You're trying to look up a key that doesn't exist in a dict

no → **Does the code use loops or if statements?**

neither →

A variable that should contain a value does not
You are storing the return value of a function which changes the variable itself (e.g. sort)

A number which should be a fraction is coming out as zero in Python 2
You are dividing integers rather than floats. Convert the numbers to floats or from __future__ import division

I'm trying to print a value but getting a weird-looking string
You are printing an object (e.g. a FileObject) when you want the result of calling a method on the object

A regular expression is not matching when I expect it to
You have forgotten to use raw strings or escape backslash characters

I am reading a file but getting no input
You have already read the contents of the file earlier in the code, so the cursor is at the end.

loops →

A list which should have a value for every iteration only has a single value
You have defined the list inside the loop: move it outside

A loop which uses the range function misses out the last value
The range function is exclusive at the finish: increase it by one.

I am trying to loop over a collection of strings, but am getting individual characters
You are iterating over a string by mistake

I am trying to write multiple lines to a file but only getting a single one
You have opened the file inside the loop: move it outside

if →

Two numbers which should be equal are not
You are comparing a number with a string representation of a number (e.g. if 3 == "3")

A complex condition is not giving the expected result
The order of precedence in the condition is ambiguous - add some parentheses

also check...

http://pythonforbiologists.com

Weeks 8-15

weeks 1-7 topics +

- data types
  - dictionaries
  - tuples
- modules
  - csv
  - json (encode/decode)
  - pathlib
  - requests
- functions
  - lambdas (anonymous functions)
- lists
  - list comprehensions
- classes

- local dev environment
  - Python install
  - source code editor/IDE
  - command line
- debugging
- file types
  - *.csv
  - *.json
- data structures
  - structured data
  - semi-structured data
- RESTful APIs
  - HTTP request/response
  - JSON

final individual project assignment

Slide deck revisions

errata: corrections and other changes

Slide no(s).	Fix ver.	Description
	v1p1	