More File I/O + Dictionaries

CSE 160 Summer 2026

Questions?

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Announcements

- **Written Check-in 4** due Friday, July 17th at 11:59pm
- **Programming Practice 3** due Sunday, July 19th at 11:59pm
- **Homework Assignment 3** due Monday, July 20th at 11:59pm
- **Resubmission 1** due Wednesday, July 22th at 11:59pm
    - If you do not submit a form, we cannot accept your resubmission
- **Practice Midterms** now available on the course website
    - Midterm on Monday, July 20th during class (9:40AM-10:40AM)

Previously on *CSE 160*…

path to file

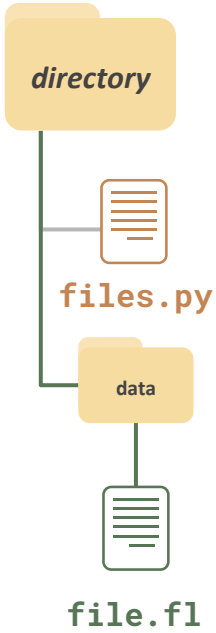
mode argument specifies how the file will be used. default = "r" (read)

```
f = open("data/file.fl", "w")

f.read()
f.write("I'm overwriting the file")

f.close()
```

reads entire file at once

Can only write strings!

Remember to close when you're done!



Today's Roadmap

1. Data Processing
2. Removing Whitespace
3. Dictionaries
4. Dictionary Methods

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with Statements

`with` statements simplify file I/O, **automatically closing the file** when finished.

```
with open("data/file.fl", "w") as file:

    file.read()
    file.write("I'm overwriting the file")
```

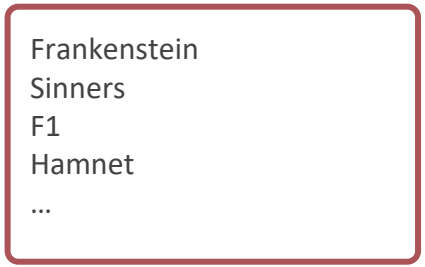
No need to call `file.close()`

Data Processing

Sometimes, just reading the file contents *isn't* enough.

To extract **useful data**, we might need to ***process*** the file contents by:

- Removing **whitespace**
- **Separating** data values



nominees.txt

```
lst = [
      'Frankenstein\n',
      'Sinners\n',
      'F1\n',
      'Hamnet\n',
      'Bugonia\n',
      'Sentimental Value\n',
      'Train Dreams\n',
      'The Secret Agent\n',
      'Marty Supreme\n',
      'One Battle After Another'
]
```

Removing Whitespace

Recall that **newline characters** (**\n**) are **included** when reading from a file.

```
file_text = "This is the first line\nThis is the second"
```

But we often want to remove **whitespace** from our data…

`string.strip(char)`

This **string method** removes any ***leading* or *trailing* characters**. If **char** is not specified, default is **whitespace**.

```
" hello     ".strip() → "hello"
```

```
"22he22llo222".strip('2') → "he22llo"
```

Not removed because it is surrounded on both sides

Separating Data Values

What if we have multiple **data values** on the same line?

```
1, 2, 5, 0
```

This **file structure** is ***comma separated values*** (`.csv`)

How can we leverage the **structure** of the file when processing the **data**?

`string.split(delim)`

This **string method** returns a **list** of strings separated by the given ***delimiter*** (`delim`). If `delim` is not specified, default is **whitespace**.

```
"1, 2, 5, 0".split(',')
→ ["1", " 2", " 5", " 0"]
```

Notice the spaces!

```
"hi CSE 160 \n".split()
→ ["hi", "CSE", "160"]
```

Data Processing Example

Given a partial list of items in **`menu.txt`** and new items and prices in the **`new_items`** and **`prices`** lists, respectively:

```
new_items = ["Chips", "Guac"]
prices = [2.0, 4.75]
```

1. ***Add*** the new menu items to the **`menu.txt`** file with the proper formatting

2. Find the ***total price*** of all menu items combined

Taco - $3.25
Burrito - $7.50

`menu.txt`

Think Pair Share

Write a program that reads in the contents of the file **`temps.dat`** and **creates a nested list**, where each element is a list of temperatures for a given week.

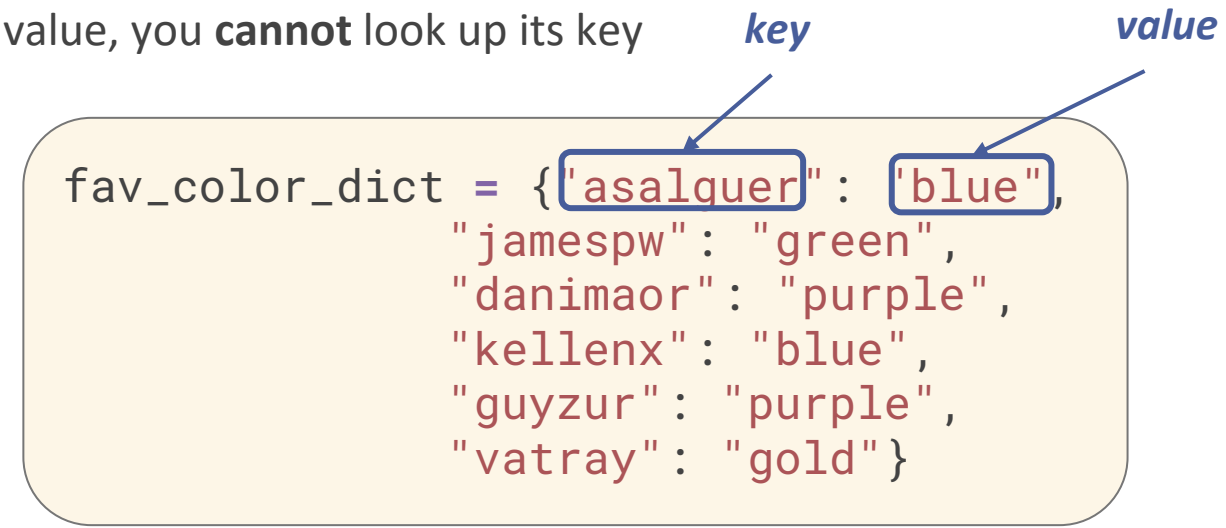
```
41, 45, 50,
46, 43, 43, 39, 41, 48, 48,
46, 52, 54, 48, 46, 46, 46,
45, 45, 45, 43, 39, 41, 39,
41, 45, 46, 48,
```

`temps.dat`

```
[[41, 45, 50],
 [46, 43, 43, 39, 41, 48, 48],
 [46, 52, 54, 48, 46, 46, 46],
 [45, 45, 45, 43, 39, 41, 39],
 [41, 45, 46, 48]]
```

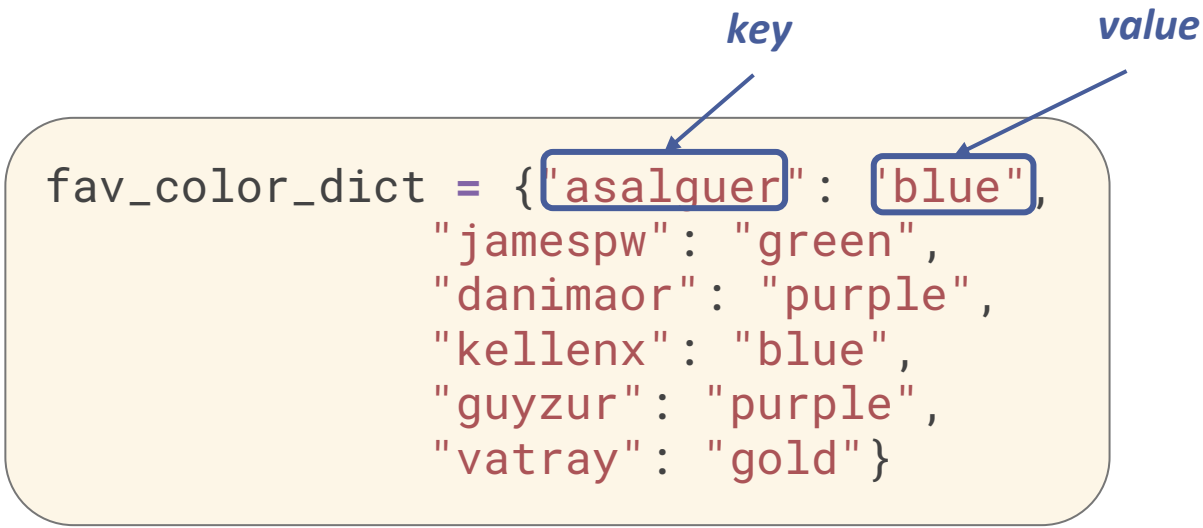
What is a Dictionary?

- A dictionary is a data structure that maps **keys** to **values**
- Unlike lists, order does not matter in dictionaries.
  - You could think of a dictionary as a big bag of key -> value pairs
- Given a key, you can look up its associated value
  - Given a value, you **cannot** look up its key



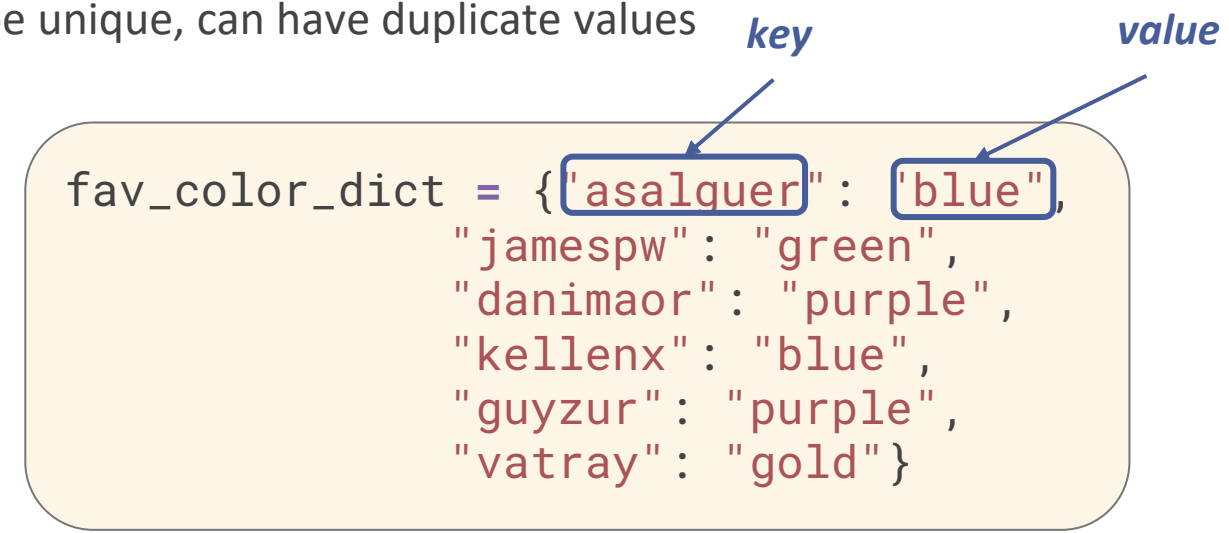
Dictionary Syntax

- **Curly braces** begin and end the dictionary
- **Colon** separates each key from its associated value
- **Comma** between each key: value pair



A Dictionary maps Keys to Values

- **Keys**:
  - Must be unique! No duplicate keys!
  - Must be an *immutable* type (e.g. integer, float, string)
- **Values**:
  - Do not need to be unique, can have duplicate values
  - Can be any type



Creating Dictionaries

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```
fav_color = {"asalguer": "blue", "jamespw": "green",
             "danimaor": "purple", "kellenx": "blue",
             "guyzur": "purple", "vatray": "gold"}

squares = {2: 4, 3: 9, 5: 25, -5: 25, -2: 4, -3: 9}

atomic_number = {"H": 1, "Fe": 26, "Au": 79}

food_price = {"Taco": 3.25, "Burrito": 7.5,
                            "Chips": 2, "Guac": 4.75}
```

Asking for the Value that goes with a Key

- We can look up the **value** that goes with a key, with an expression like this:

  `dict_name[key]`

```
fav_color = {"asalguer": "blue", "jamespw": "green",
             "danimaor": "purple", "kellenx": "blue",
             "guyzur": "purple", "vatray": "gold"}
adrians_fav_color = fav_color["asalguer"]

squares = {2: 4, 3: 9, 5: 25, -5: 25, -2: 4, -3: 9}
x = squares[5] + squares[-5]

atomic_number = {"H": 1, "Fe": 26, "Au": 79}
print(atomic_number["Au"])
```

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What if a Key is not present?

- It is a `KeyError` if a key is not present in the dictionary

```
fav_color = {"asalguer": "blue", "jamespw": "green",
             "danimaor": "purple", "kellenx": "blue",
             "guyzur": "purple", "vatray": "gold"}
adrians_fav_color = fav_color["asalguer"]

print(fav_color["vatray"])  # "gold"
print(fav_color["dubs"])  # KeyError: 'dubs'
```

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Another way to Create a Dictionary

- We can create an empty dictionary using empty curly braces: { }
- We can **add** a mapping to a dictionary with an assignment statement like this:

```
dict_name[key] = value
```

```
fav_color = {}  # Creates an empty dictionary
fav_color["asalguer"] = "blue"
fav_color["jamespw"] = "green"
fav_color["danimaor"] = "purple"
fav_color["kellenx"] = "blue"
fav_color["guyzur"] = "purple"
fav_color["vatray"] = "gold"
```

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Changing the Value that goes with a Key

- We can change the **value** that goes with a key, like this:

```
dict_name[existing_key] = new_value
```

```
fav_color = {"asalguer": "blue", "jamespw": "green",
             "danimaor": "purple", "kellenx": "blue",
             "guyzur": "purple", "vatray": "gold"}

# Adrian decided he likes purple better
fav_color["asalguer"] = "purple"
```

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Removing a Key

- We can remove a **key** (and its value) with a **del** statement:

```
del dict_name[existing_key]
```

```
fav_color = {"asalguer": "blue", "jamespw": "green",
             "danimaor": "purple", "kellenx": "blue",
             "guyzur": "purple", "vatray": "gold"}

# Kellen would like to be removed from this dictionary
del fav_color["kellenx"]
# You can only delete existing keys, not values
del fav_color["purple"]  # KeyError: 'purple'
```

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Think Pair Share

Select **all** of the statements that will result in an error (or indicate that none do):

A. `print(food_price[2])`

B. `food_price["Guac"] = 3`

C. `del food_price["taco"]`

A. `food_price[2] = "Chips"`

B. None of these cause an error

```
food_price = {"Taco": 3.25,
              "Burrito": 7.5,
              "Chips": 2,
              "Guac": 4.75}
```

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Is a Key in a dictionary?

`x in dict_name` is a boolean expression that evaluates to **True** if **`x`** is *one of the keys* in **`dict_name`**.

`x not in dict_name` is a boolean expression that evaluates to **True** if **`x`** is ***not*** *one of the keys* in **`dict_name`**.

```
fav_color = {"asalguer": "blue", "jamespw": "green",
             "danimaor": "purple", "kellenx": "blue",
             "guyzur": "purple", "vatray": "gold"}

print(fav_color["asalguer"])        # "blue"
print("maria" not in fav_color)     # True
print("jamespw" in fav_color)       # True
print("blue" in fav_color)          # False
```

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More Dictionary Methods

- `dict_name.keys()`
  - Retrieve all the keys in the dictionary
  - Returned in the form: `dict_keys([key1, key2,...])`
- `dict_name.values()`
  - Retrieve all the values in the dictionary
  - Return in the form: `dict_values([value1, value2,...])`
- `dict_name.items()`
  - Retrieve all the key-value pairs in the dictionary
  - Returned in the form: `dict_items([(key1, value1), (key2, value2), …])`

These are not lists, but a special dictionary object!
However, you can iterate through them using a for-loop just like a list!

Iterating through a dictionary

- Usually we want to look up what value is a associated with a single key:
  ```
  print("Adrian's fav color is ", fav_color["asalguer"])
  ```
- Sometimes it is useful to iterate over an entire dictionary
  - Note: It is not necessary to iterate over a dictionary to find a key, just look it up!
    ```
    print("The person's fav color is ", fav_color[person])
    ```

```
fav_color = {"asalguer": "blue", "jamespw": "green",
             "danimaor": "purple", "kellenx": "blue",
             "guyzur": "purple", "vatray": "gold"}

for uwnetid in fav_color.keys():
    print(uwnetid, " fav color is ", fav_color[uwnetid])
```

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Usually you should not iterate over a dictionary

- A very common mistake is to iterate over a dictionary with a loop, when all that is needed is to do a look up of a single value
- Iterate over a dictionary with a loop when:
  - You need to **modify** the values associated with every key in the dictionary
  - You need to **print** the values associated with every key in the dictionary
- Do NOT use a loop when you just need to look up the value associated with one key!

```
fav_color = {"asalguer": "blue", "jamespw": "green",
             "danimaor": "purple", "kellenx": "blue",
             "guyzur": "purple", "vatray": "gold"}

for uwnetid in fav_color.keys():
    print(uwnetid, " fav color is ", fav_color[uwnetid])
```

Counting words

Write code that uses a dictionary to count how many times each unique word appears in a phrase.

```
phrase = "how much wood could a woodchuck chuck if a
woodchuck could chuck wood"
```

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