Welcome!

Please sit with your group members!

Data Structures

4/5/2022

Announcements

Lists

- Collection of objects
- Allows for duplicates and multiple types
- Adding to a list
- Removing from a list
- Parsing into a list

Lists

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my_list = []
a = my_list
```

- Doing the following does not make a copy of the list, it instead just points to the same memory address
- Can check this with the id() function

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sorted(iterable, key=key, reverse=reverse)
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An iterable object like a list

Optional, a function to decide HOW it is sorted

Optional, can set to true if we want the list to sort in depending order

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Enumerate

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enumerate(iterable, start=0)
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An iterable object like a list

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Tuple

- Basically same thing as a list, just immutable and defined by ( ) instead of [ ]
- Why is this helpful?
    - Permanence
    - Hashable (when objects inside are hashable)

Tuple Packing and Unpacking

- If we set a variable to a list of objects separated by commas, this will automatically create a tuple. This is called packing.
- If we do the opposite, and set mutiple variable names separated by commas to a tuple, it will assign the corresponding values from the tuple to the variables. This is unpacking.
- We can also use these together set multiples variables as once like so:

```
first, last = "Tara", "Jones"
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Sets

- A mutable object similar to a list, but can only contain hashable objects and cannot contain duplicates
- Unlike a list or a tuple, this is unordered
- Adding, removing
- Support math operations

```
my_set = set()
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Dictionaries

Key, Value

Must be hashable, unique

Can be anything!

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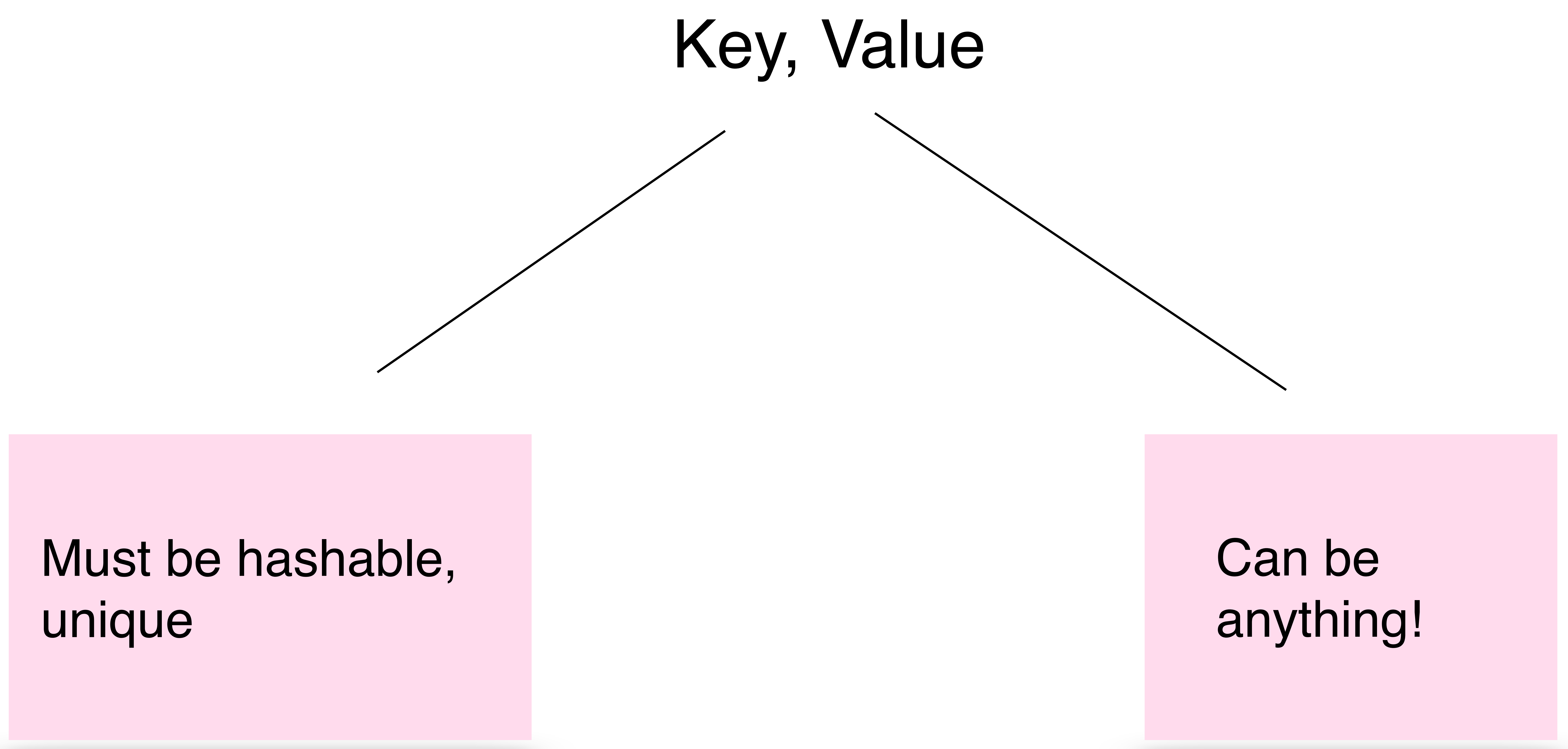
Dictionaries



Dictionaries

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grades["CS41"] = "Credit"
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Dictionaries

- Removing
- Getting keys, values
- Looping through

Activity: Data Structures

Let’s take a content break and talk logistics

Discussion Norms

Engage

- Take space when it's your turn to speak, then step down and make space for others.
- Be willing to talk and engage—especially with your team and your peers.
- Be open to being wrong and being challenged.
- No cold-calling.
- The course staff should strive to allow everyone to participate in the discussion so that it isn't monopolized.

Have Empathy

- Don't judge people for asking questions and respect their ideas.
- Be conscious of different experiences and backgrounds in CS and life more generally.
- When being critical, make sure to be respectful.

In groups

- Everyone should introduce themselves with their name and pronouns (if comfortable) first.
- Group members should check in on each other at the beginning of meetings.

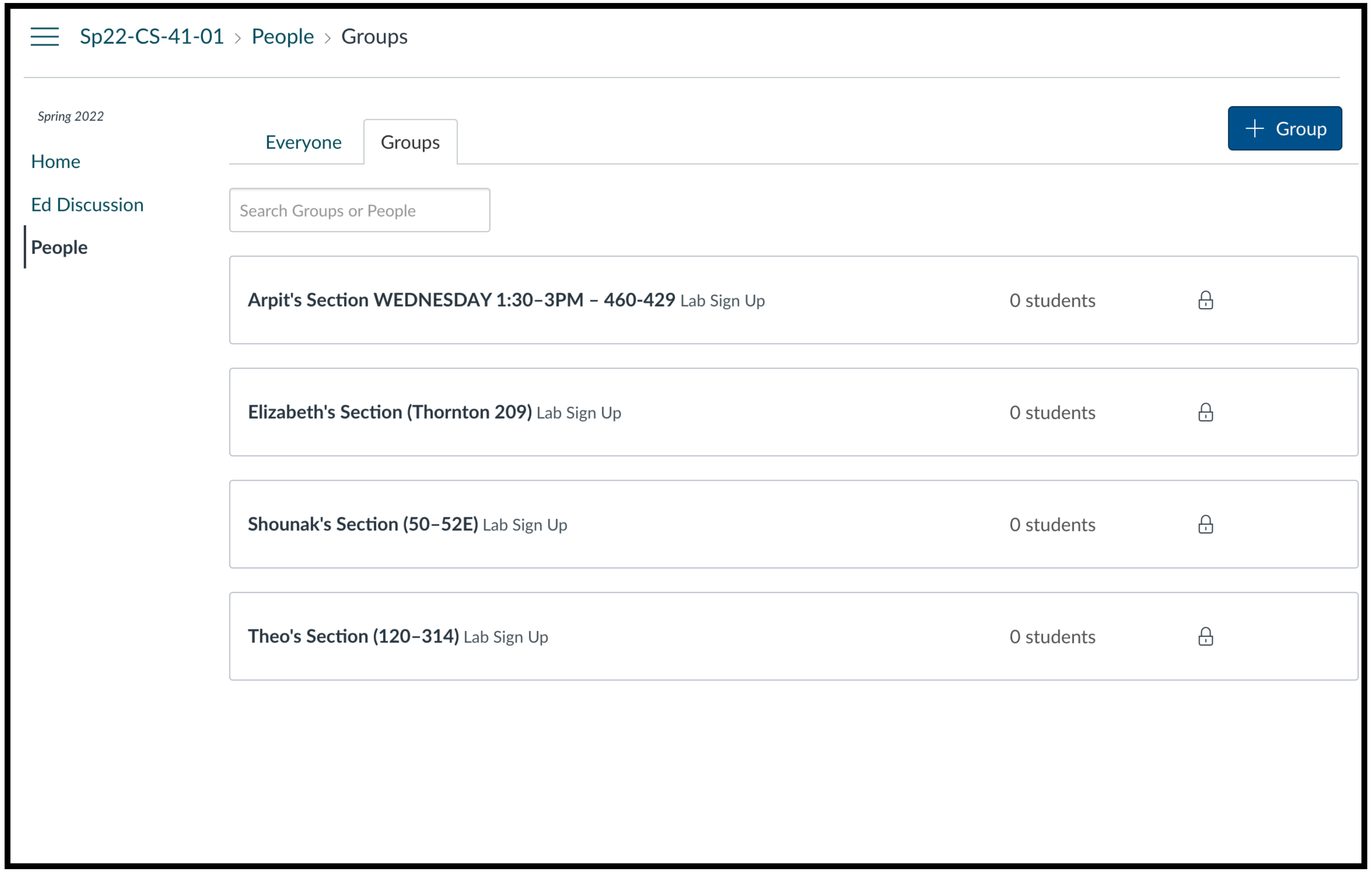
Logistical

- Use Ed to ask and answer questions of each other and of the course staff.
- Maintain open, honest, and frequent communication between students and staff.

And lastly… Take breaks

- Have breaks or low-energy transitions between topics.
- Be easy on yourself! :)

Sign up for sections



Sp22-CS-41-01 › People › Groups

Spring 2022

Home

Ed Discussion

People

Everyone | Groups

+ Group

Search Groups or People

Arpit's Section WEDNESDAY 1:30–3PM – 460-429 Lab Sign Up	0 students	🔒
Elizabeth's Section (Thornton 209) Lab Sign Up	0 students	🔒
Shounak's Section (50–52E) Lab Sign Up	0 students	🔒
Theo's Section (120–314) Lab Sign Up	0 students	🔒

Assignment 1

- Will be released this Thursday
- Focuses on group dynamics
- We want to know how your group is going!

Dear Data Video

Dear Data Video

Reading!

Comprehensions

- Very very cool python feature!
- Can “flatten” a loop
- Let’s try to double everything in a list

Comprehensions

- General pattern here is:

```
[fn(elem) for elem in collection]
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Dictionary Comprehensions

```
counts = {"dog": 4, "cat" : 4, "the": 8, "grass": 4}
#double keys
counts = {key: value*2 for key,value in counts.items()}
print(counts)
```

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Activity: List Comprehensions

Lecture Code

Lists, Sorted

```
star_wars = ["R2D2", "C3P0", "Luke", "Vader"]

print(sorted(star_wars))
#['C3P0', 'Luke', 'R2D2', 'Vader']

print(star_wars)
#notice it did not change the actual list
#['R2D2', 'C3P0', 'Luke', 'Vader']

star_wars.sort() #but this does
print(star_wars)
#['C3P0', 'Luke', 'R2D2', 'Vader']


def second_letter(s):
    return s[1]

star_wars = sorted(star_wars, key=second_letter)
print(star_wars)
#['R2D2', 'C3P0', 'Vader', 'Luke']

star_wars= sorted(star_wars, reverse=True)
print(star_wars)
#['Vader', 'R2D2', 'Luke', 'C3P0']
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#['Vader', 'R2D2', 'Luke', 'C3P0']
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Lists, Sorted

```python
my_list = []

my_list.append("CS41")
my_list.append(6)
my_list.append("CS41")
my_list.insert(1,"Horses")

# ['CS41', 'Horses', 6, 'CS41']

my_list.append(5)
my_list.remove("CS41")
my_list.pop(3)

# ['Horses', 6, 'CS41']

my_list[1] += 1
# ['Horses', 7, 'CS41']
```

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star_wars = ["R2D2", "C3P0", "Luke", "Vader"]

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```

Enumerate

```
students_2022 = ["Tara", "Parth", "Theo", "Elizabeth"]

#every students ID will be their graduation year plus a unique int

print((list(enumerate(students_2022, 20220))))
#[(20220, 'Tara'), (20221, 'Parth'), (20222, 'Theo'), (20223, 'Elizabeth')]
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```

Tuple

```
address = ("680 Lomita", "Stanford", "CA")
address.append("USA") #will throw an Attribute Error
```

```
#packing

a = 1
b = 2
c = 3

nums = a,b,c #packing
a+=1 #will not affect the tuple

my_tup = (4,5,6)
a,b,c = my_tup #unpacking


print(a,b,c)
first, last = "Tara", "Jones"
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Dictionaries

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grades = {}

grades["CS41"] = "Credit"
grades["Math51"] = "B-"

print(grades["CS41"])
#print(grades["Phsyics43"]) #will give an error
print(grades.get("Phsyics43")) #will give None

del grades["Math51"]

print(grades.keys())
print(grades.values())
print(grades.items())

for key,value in grades.items():
    print(key,value)
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Activity 1

```
def create_counts_dict(s):
    """
    Returns a dictionary that maps a word to how many times it showed up in the string.
    """
    words = s.split(" ")
    d = {}
    for word in words:
        word = word.lower()
        if word not in d:
            d[word] = 0
        d[word]+=1
    return d

def mix_things_up(counts):
    new_counts = {}
    for key,value in counts.items():
        if value not in new_counts:
            new_counts[value] = []
        new_counts[value].append(key)
    return new_counts
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Comprehensions

```
l = [1,2,3,4,5]

for i in range(len(l)):
    l[i] *= 2

print(l)

l = [1,2,3,4,5]
l = [n*2 for n in l]
print(l)
```

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