

Selection in Programming and Python



Admin



- Quiz
- Reading: read chapter 5 in the book with these slides
- <https://www.linkedin.com/feed/update/urn:li:activity:7510297214338912258/>

Don't always do the same thing



- Sometimes we don't want to do the same thing every time
 - Do you come to comp151 every day at this time?
 - How do you know when to come here?
 - Lucky volunteer?

Don't always do the same thing



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 - Do you come to comp151 every day at this time?
 - How do you know when to come here?
 - Lucky volunteer?
 - If the day is (fill in today) then come in,
 - If the day is Saturday, don't come in
 - Holidays etc?

Selection



- The programming language agnostic term for doing something only if some condition is true is **selection**
 - As in we select this code only in this case.
- Selection in python starts with the keyword **if**
- Syntax of basic if statement
- **if** <condition>:
 - do this code block if <condition> was True
- Word on BNF and <stuff> format

condition



- The condition can be anything that evaluates to a **boolean** value
 - Fancy comp sci/math way of saying a value that can be either True or can be False (but nothing else)
 - So what kinds of conditions might we have?
 - What are easy things you can think of that we might check?

condition



- The condition can be anything that evaluates to a **boolean** value
 - Fancy comp sci/math way of saying a value that can be either True or can be False (but nothing else)
 - So what kinds of conditions might we have?
 - What are easy things you can think of that we might check?
 - Common easy ones in CS
 - Check equality between two values
 - Check inequality (is age greater than 21 well then you can get into the bar)
 - Check function to ask about the world
 - Is the stove on?

Equality and Assignment



- What does = mean in python?

Equality and Assignment



- What does = mean in python?
 - Assignment
- `age = int(input("How old are you"))`
 - The thing on the right is stuffed into the variable on the left.
- Equality in python is
 - `==`
- `if course == "comp151":`
 - `print("you are here")`

Equalities and Inequalities



- In Python
 - Equality
 - `==`
 - Greater than
 - `>`
 - Less than
 - `<`
 - Not equal
 - `!=`
- Greater than or equal to
 - `>=`
- Less than or equal to
 - `<=`

If example 2



- Inequality example
-
- Notice that like for, if has a **code block**,
 - every line indented from the if line is executed if and only if (iff) the condition was true.

```
age = int(input("How old are you"))  
if age >= 21:  
    print("welcome to the Poker Table")  
    print("come as you are")
```

Lists, for-each, and if



- Lets put the last couple of weeks together,
 - Take the list of numbers (years that the US began a recession) that you find here and
 - Count how many were election years (evenly divisible by 4)
 - So for-each through the list, then if the year is evenly divisible by four add one to total_election_years.
 - Finally, print out the number
 - Lets work through this one together.

```
us_recession_start_years=[1920, 1923, 1926, 1929, 1937,  
1945, 1949, 1953, 1958, 1960, 1969, 1973, 1980, 1981,  
1990, 2001, 2008, 2020]  
total_election_years = 0
```

Checking for values in/not in a list



- Python has a “pretend it’s English” approach to checking if something is in a list.
-
-
- Also for checking if something is not in the list
- ```
courses = ["comp151", "comp152", "math130", "math120"]
```
- ```
if "comp250" in courses:  
    print("yes it is there")
```
-
-
- ```
if "comp250" not in courses:
 print("You haven't taken Data Structures yet.")
```
-

# Comparing text



- Oh those troublesome users!
  - Users unpredictable. Type yes to continue.
  - Underneath it all computers just manipulate what?
  - Lucky volunteer?

# Comparing text



- Oh those troublesome users!
  - Users unpredictable. Type yes to continue.
  - Underneath it all computers just manipulate what?
  - Numbers. And the numbers that associate with a capital letter character is different than its lower case equivalent.

|    |   |     |   |
|----|---|-----|---|
| 65 | A | 97  | a |
| 66 | B | 98  | b |
| 67 | C | 99  | c |
| 68 | D | 100 | d |
| 69 | E | 101 | e |
| 70 | F | 102 | f |
| 71 | G | 103 | g |
| 72 | H | 104 | h |
| 73 | I | 105 | i |
| 74 | J | 106 | j |
| 75 | K | 107 | k |
| 76 | L | 108 | l |
| 77 | M | 109 | m |
| 78 | N | 110 | n |
| 79 | O | 111 | o |
| 80 | P | 112 | p |
| 81 | Q | 113 | q |

## Comparing text II



- What will happen when running the code to the right?
  - 
  - 
  - 
  - How could we adjust it to be what we want?
- `answer = "Yes"`
  - `if answer == "yes"`
    - `print("you were right")`

## Comparing Text III



- Ask the string to lower case itself and compare downcase
- `answer = input("enter yes to continue")`
- `if answer.lower() == "yes":`
  - `print("we will keep going")`

# Comparing multiple conditions



- From time to time you need to check multiple conditions
  - If both must be true, then combine with `and`
  - If only one must be true use `or`
  - Eg
    - `if course=='comp199' or course_num>300:`
      - `give_access_to_dmf359()`
      - `# will give access if either condition is true`
    - `If today == 'Wednesday' and meeting_message != 'canceled':`
      - `print("time to go to the meeting")`
      - `#both of them have to be true or I'm not going to a meeting`

# And and Or – how do they work?



- Most of you are taking or have taken your logical reasoning class
  - For **and** to be true, what has to be true?
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- True and False => ??

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# And and Or – how do they work?



- Most of you are taking or have taken your logical reasoning class
  - For **and** to be true, what has to be true?
  - For **or** to be true what has to be true?
  - What do you notice about the highlighted conditions?

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- False or False  $\Rightarrow$  False

# 'Short Circuit' Logical Operators



- Since False and <anything> is false
- Since True or <anything> is true
- In both cases python will 'short circuit' the condition and not evaluate the second condition.
  - Use to help efficiency
- See example to right for why this is important

```
import comp151Helpers
```

```
graduation_list = ["stu dent", "All Done", "Fin Ished"]
name = input("What is the student's name")
if comp151Helpers.get_credits_from_database(name) > 120
or name in graduation_list:
 print("Congrats!!!! you are eligible for graduation!!!")
```

## 'Short Circuit' Logical Operators II



- When a logical operator (and/or) short circuits, the second condition is never evaluated at all
  - Can in fact contain errors and program could still run as long as the and/or operator short circuits
- Demo in pycharm

# If-else



- Sometimes we want to do one thing if the condition is true, but another if the condition is false
  - In python use if-else

```
answer = input("would you like to continue:")
if answer.lower() == "yes":
 print("we will continue")
else:
 print("ok we will quit the program")
 exit(0)
```

## Another example



- Another example
- (again how should we fix this?)

```
import comp151Helpers

graduation_list = ["stu dent", "All Done", "Fin Ished"]
name = input("What is the student's name")
if comp151Helpers.get_credits_from_database(name) > 120
or name in graduation_list:
 print("Congrats!!!! you are eligible for graduation!!!")
else:
 print(f"sorry, with you can't graduate yet")
```

# What about multiple conditions?



- Python also supports checking multiple conditions using if-elif-else
  - The entire series of conditions forms one set of conditions,
  - As soon as one condition is true, the rest are all skipped.
    - **Always put most restrictive condition first**
  - See example to right.
  - Then try with all if and no elif in pycharm to see difference.

```
answer = input("What do you think about 4Chan?")
if len(answer) > 200:
 print("wow, you had a lot to say about that")
elif len(answer) > 125:
 print("I didn't know you thought about it that much")
elif len(answer) > 50:
 print("I guess that is about right")
elif len(answer) > 1:
 print("fairly laconic huh?")
else:
 print("Don't want to talk about it huh?")
```

## In class exercise



- Get sillyrec.txt
  - This is a recommendation written under duress, the real recommendation is found by printing every other line.
  - Lets put the last few weeks together
    - Open the file
    - Read all the lines
    - Create a line\_number variable and set it to 1
    - For each line,
      - If it is an odd numbered line, print it otherwise skip it.
      - Add one to line\_number

## In class project



- Lets do one more in class project
- 
- Problem details on next page
- Get the .txt file from the resources page
- The data is in the format
  - Let's take a look and find out.

## In Class Exercise



- Open the file and read the contents of the file
- Open a NiceGUI window
- Draw a graph with labeled axes
- For each line in the file
  - Let's draw a bar for.. (discuss in class)

# assignment



- Read chapter 5
- See project 4 assignment