Selection in Programming and Python

Admin

- Quiz
- Reading: read chapter 5 in the book with these slides

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

- 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?
    - 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 a 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?

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  - 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 Bar")
    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?
  - For or to be true what has to be true?

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- True and False => ??

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- False and True => ??

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- False and True => False
- False 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?

- True and False => False
- False and True => False
- False and False => False
- True and True => True
- True or False => True
- True or True => True
- False or True => True
- False or False => 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.
  - 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 MoviesvsGames.txt file from the resources page
- The data is in the format
- Year:movie revenue:games revenue
- The revenue numbers are in billions

In Class Exercise

- Open the file and read the contents of the file
- Open a dearpygui window
- For each line in the file
  - Split the line into the three bits of data
  - Let's draw a horizontal rectangle that is 50 pixels for each billion dollars of game revenue
  - Draw the rectangle in one color if there was more game money than movie money
  - Draw the rectangle in another color if there was more movie money than game money
  - Draw the year at the end of the rectangle.

assignment

- Read chapter 5
- See project 4 assignment