Lecture 4

Strings, if/else, return, user input

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Strings

<table>
<thead>
<tr>
<th>index</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>or</td>
<td>-8</td>
<td>-7</td>
<td>-6</td>
<td>-5</td>
<td>-4</td>
<td>-3</td>
<td>-2</td>
<td>-1</td>
</tr>
<tr>
<td>character</td>
<td>P</td>
<td>.</td>
<td>D</td>
<td>i</td>
<td>d</td>
<td>d</td>
<td>y</td>
<td></td>
</tr>
</tbody>
</table>

• Accessing character(s):
  - `variable [ index ]`
  - `variable [ index1 : index2 ]`

- `index2` is exclusive
- `index1` or `index2` can be omitted (end of string)

```python
>>> name = "P. Diddy"
>>> name[0]
'P'
>>> name[7]
'y'
>>> name[-1]
'y'
>>> name[3:6]
'Did'
>>> name[3:]
'Diddy'
>>> name[::2]
'P. Did'
```
String Methods

Python

<table>
<thead>
<tr>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>len(str)</code></td>
</tr>
<tr>
<td><code>startswith, endswith</code></td>
</tr>
<tr>
<td><code>upper, lower, isupper, islower, capitalize, swapcase</code></td>
</tr>
<tr>
<td><code>find</code></td>
</tr>
<tr>
<td><code>strip</code></td>
</tr>
</tbody>
</table>

```python
>>> name = "Jordan Hiroshi Nakamura"
>>> name.upper()
'JORDAN HIROSHI NAKAMURA'
>>> name.lower().startswith("jordan")
True
>>> len(name)
23
```
A for loop can examine each character in a string in order.

```python
>>> for c in "booyah":
...     print(c)
...     print(c)
...     print(c)
...     print(c)
  b
  o
  o
  y
  a
  h
```
input

input : Reads a string from the user's keyboard.
– reads and returns an entire line of input

```python
>>> name = input("Howdy. What's yer name? ")
Howdy. What's yer name? Paris Hilton

>>> name
'Paris Hilton'
```
**input for numbers**

- to read a number, cast the result of `input` to an `int` or `float` (real number)
  - Only numbers can be cast as `ints`!
  - Example:

    ```python
    age = int(input("How old are you? "))
    print("Your age is", age)
    print("You have", 65 - age, "years until retirement")
    
    Output:
    
    How old are you? 53
    Your age is 53
    You have 12 years until retirement
    ```
if

if condition:
    statements

- Example:
  
gpa = float(input("What is your GPA? "))
if gpa > 2.0:
    print("Your application is accepted."")
if/else

if condition:
    statements
elif condition:
    statements
else:
    statements

– Example:
gpa = float(input("What is your GPA? "))
if gpa > 3.5:
    print("You have qualified for the honor roll.""
elif gpa > 2.0:
    print("Welcome to Mars University!"
else:
    print("Your application is denied.""

Logical Data Type

• Logic data value: True or False
  >>> 3 > 2

  >>> 3 <= 2

• Logic operator: and, or, not
  >>> (3 > 2) and (2 < 4)

  >>> (3 > 2) or (2 < 4)

  >>> (3 >> 2) or (2 == 4)
## Logical Operators

<table>
<thead>
<tr>
<th>Operator</th>
<th>Meaning</th>
<th>Example</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>==</code></td>
<td>equals</td>
<td><code>1 + 1 == 2</code></td>
<td>True</td>
</tr>
<tr>
<td><code>!=</code></td>
<td>does not equal</td>
<td><code>3.2 != 2.5</code></td>
<td>True</td>
</tr>
<tr>
<td><code>&lt;</code></td>
<td>less than</td>
<td><code>10 &lt; 5</code></td>
<td>False</td>
</tr>
<tr>
<td><code>&gt;</code></td>
<td>greater than</td>
<td><code>10 &gt; 5</code></td>
<td>True</td>
</tr>
<tr>
<td><code>&lt;=</code></td>
<td>less than or equal to</td>
<td><code>126 &lt;= 100</code></td>
<td>False</td>
</tr>
<tr>
<td><code>&gt;=</code></td>
<td>greater than or equal to</td>
<td><code>5.0 &gt;= 5.0</code></td>
<td>True</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operator</th>
<th>Example</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>and</td>
<td><code>(2 == 3) and (-1 &lt; 5)</code></td>
<td>False</td>
</tr>
<tr>
<td>or</td>
<td><code>(2 == 3) or (-1 &lt; 5)</code></td>
<td>True</td>
</tr>
<tr>
<td>not</td>
<td><code>not (2 == 3)</code></td>
<td>True</td>
</tr>
</tbody>
</table>
if value in sequence:
    statements

- The sequence can be a range, string, tuple, or list

- Examples:

```python
x = 3
if x in range(0, 10):
    print("x is between 0 and 9")

name = input("What is your name? ")
name = name.lower()
if name[0] in "aeiou":
    print("Your name starts with a vowel!")
```
Exercise 1

• Please write a Python program
  1. Input your age on the keyboard
  2. If the age $\geq 10$ and age $< 18$, then print “Best year, you are a teenager”,
     If the age $< 10$, then print “Sorry, please grow up fast”
     If the age $\geq 18$, then print “Great, you are an adult now!”
Exercise 2

1. Please write a Python program to find the roots of a quadratic equation $f(x) = ax^2 + bx + c$
2. Please input three coefficients $a$, $b$, $c$ from your keyboard
3. If there are no real roots, please print “Sorry, no real roots” (a=1,b=2,c=3)
4. If there are two different real roots, please print
   root1 = 2
   root2 = 3 (a=1,b=-5, c=6)
5. If there are two same real roots, please print
   These two roots are the same = 1 (a=1, b=-2, c=1)

Hint: You need to use math package for sqrt() function from math import *
Exercise 3

• Please write a Python program to count the vowels (a,e,i,o,u) from the strings input from the keyboard

for example, input string “abcdef”
Output: The number of vowels is: 1

Hint: 1. Use (for xx in “aeiou”) to check if a letter is a vowel
2. use (fox x in str1) to loop through the input string
• Write a program that reads two employees’ hours and display each’s total and the overall total.
  – Cap each day at 8 hours
    Employee 1: How many days? 3
    Hours? 6
    Hours? 12
    Hours? 5
    Employee 1's total hours = 19 (6.33 / day)
    Employee 2: How many days? 2
    Hours? 11
    Hours? 6
    Employee 2's total hours = 14 (7.00 / day)
    Total hours for both = 33