

HKUST Future-Ready Scholars

Introduction to Game Programming using Python

Part 2: Hangman

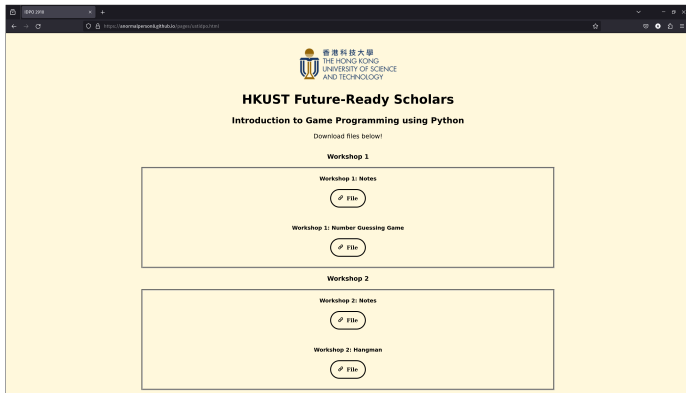
4 May 2024



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Then head to
<https://colab.research.google.com/>

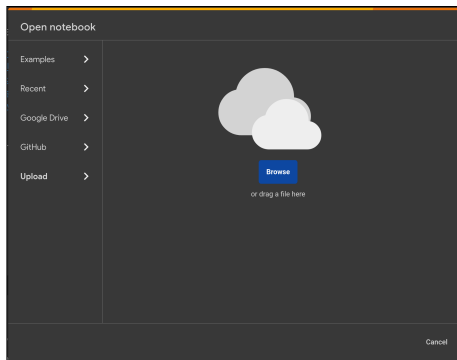
All materials today are at:
<https://bit.ly/ustidpo>



Download all files that belong to **Workshop 2**.

Jupyter Notebook

Now upload your Jupyter Notebook file with **Files** → **Open Notebook**.



Upload the file **Hangman.ipynb**.

Using Jupyter Notebook

You can type your code in these blocks. We call these blocks code cells.



```
print("Mum I am in HKUST typing code in a code block")
```

You can run a code cell with the button on the left.



```
print("Hello World!") # Prints "Hello World!"
```

Summary from Last Workshop

Let's look at what we learnt last time.

Summary from Last Workshop

Variable types

There are 4 basic variable types: `int`, `bool`, `float` and `str`.

Arithmetic Operators

Some basic and commonly-used operators:

<code>+</code> :	add	<code>-</code> :	minus,
<code>*</code> :	multiply	<code>/</code> :	divide,
<code>//</code> :	quotient	<code>%</code> :	remainder,
<code>**</code> :	power		

Summary from Last Workshop

The `print()` statement

```
print(*objects)
```

`*objects` - the things you want to print

The `input()` statement

```
input(prompt)
```

where `prompt` is quite literally what it means. It prints the output, then returns the value inputted as a string.

`random.randint()`

```
random.randint(a, b)
```

`a` - the lower bound of your range

`b` - the upper bound of your range

This generates an integer `n` where $a \leq n \leq b$.

Summary from Last Workshop

if, elif and else

if, elif and else clauses are used to decide whether some code should be executed. Whenever one is fulfilled, all others are ignored.

```
if condition1: # if condition1 is true
    # Do something, ignore all elif and else below

elif condition2: # if condition2 is true
    # Do something, ignore all elif and else below

elif condition3: # if condition3 is true
    # Do something, ignore all elif and else below

else: # if all the conditions above are false
    # Do something
```

Summary from Last Workshop

The and logic operator

The and operator makes it so that both conditions have to be fulfilled in order for the code it is under to execute.

The or logic operator

The or operator makes it so that only 1 of the conditions have to be fulfilled in order for the code it is under to execute.

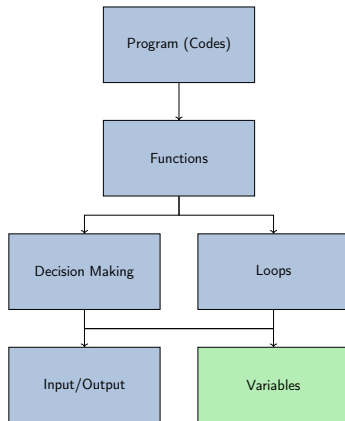
The not logic operator

The not operator reverses the condition it is attached to.

Multiple logic operators

One can chain multiple logic operators together, but to be safe add brackets () to make sure the condition works as intended.

Contents



Imagine you have a bunch of variables you want to store. For example, if you have a bunch of people's names.

```
name0 = "Chris Wong"  
name1 = "Desmond Tsoi"  
name2 = "Phoebe Mok"  
name3 = "Nancy Ip"
```

That is annoying to store and access.

What if instead, we store it in the same thing, as a... list?

Lists

```
names = ["Chris Wong", "Desmond Tsoi",  
         "Phoebe Mok", "Nancy Ip"]  
print(names[0]) # Chris Wong
```

Lists are declared by surrounding the items with [], and separating each item with a comma.

We can get the name from a list by getting the corresponding item. How? With list[index].

The first item in the list is the 0th item, second is 1st item, etc...

We call this zero-indexing.

Note: Some programming languages use one-indexing instead.

If you approach another programming language, be careful.

```
names = ["Chris Wong", "Desmond Tsoi",  
         "Phoebe Mok", "Nancy Ip"]  
print(names[0], names[1], names[2], names[3])  
# Output: Chris Wong Desmond Tsoi Phoebe Mok Nancy Ip
```

Another example:

```
# Indices: 0  1  2  3  4  5
numbers = [0, 1, 1, 2, 3, 5]
print(numbers[0], numbers[1], numbers[2],
      numbers[3], numbers[4], numbers[5])
# Output: 0 1 1 2 3 5

print(numbers)
# Output: [0, 1, 1, 2, 3, 5]
```

Printing the whole list

To print the whole list, simply put it in the `print()` function.

To get the length of a list, we can use the `len()` function.

```
numbers = [0, 1, 1, 2, 3, 5]  
print(len(numbers)) # 6
```


To edit an element of a list, assign the new value to the correct index.

```
numbers = [0, 1, 1, 2, 3, 5]
print(numbers) # [0, 1, 1, 2, 3, 5]
numbers[1] = 100 # Edit the second element (index 1)
print(numbers)
# Output: [0, 100, 1, 2, 3, 5]
```

To add an element to the end to a list, we use the `append(value)` list function.

```
numbers = [0, 1, 1, 2, 3, 5]
print(numbers, "length:", len(numbers))
# Output: [0, 1, 1, 2, 3, 5] length: 6
numbers.append(100) # Add 100 to the end of the list
print(numbers, "length:", len(numbers))
# Output: [0, 1, 1, 2, 3, 5, 100] length: 7
```

To insert an element to a particular position in a list, we use the `insert()` list function.

The `insert(i, value)` inserts the value at index `i`, and push everything after to the right.

```
numbers = [0, 1, 1, 2, 3, 5]
print(numbers, "length:", len(numbers))
# Output: [0, 1, 1, 2, 3, 5] length: 6
numbers.insert(2, 100) # Add 100 to index 2 of the list
print(numbers, "length:", len(numbers))
# Output: [0, 1, 100, 1, 2, 3, 5] length: 7
numbers.insert(7, 200) # Same as numbers.append(200)
print(numbers, "length:", len(numbers))
# Output: [0, 1, 100, 1, 2, 3, 5, 200] length: 8
```

To remove an element from a list, we use the `remove()` list function. The `remove(value)` function removes the **first** occurrence of value.

```
numbers = [0, 1, 1, 2, 3, 5]
print(numbers, "length:", len(numbers))
# Output: [0, 1, 1, 2, 3, 5] length: 6
numbers.remove(1) # Remove the first occurrence of number 1
print(numbers, "length:", len(numbers))
# Output: [0, 1, 2, 3, 5] length: 5
```

The `reverse()` list function reverses a list's contents.

```
numbers = [0, 1, 1, 2, 3, 5]
print(numbers, "length:", len(numbers))
# Output: [0, 1, 1, 2, 3, 5] length: 6
numbers.reverse() # Reverse the list
print(numbers, "length:", len(numbers))
# Output: [5, 3, 2, 1, 1, 0] length: 6
print(numbers[0])
# Output: 5
```

The `count(item)` list function counts the number of occurrence of `item` in a list.

```
numbers = [0, 1, 1, 2, 3, 5]
```

```
print(numbers.count(1))
```

```
# Output: 2
```

```
print(numbers.count(100))
```

```
# Output: 0
```

We can check if an element is in a list with the `in` operator.

```
numbers = [0, 1, 1, 2, 3, 5]
```

```
if 0 in numbers:
```

```
    print("0 is in numbers.") # This line is run
```

```
else:
```

```
    print("0 is not in numbers.")
```

```
if 8 in numbers:
```

```
    print("8 is in numbers.")
```

```
else:
```

```
    print("8 is not in numbers.") # This line is run
```

The `index(item)` list function finds the index of the first occurrence of `item` in a list.

```
numbers = [0, 1, 1, 2, 3, 5]
```

```
print(numbers.index(1))
```

```
# Output: 1
```

```
print(numbers.index(5))
```

```
# Output: 5
```

```
print(numbers.index(100))
```

```
# Output: No output, error, 100 is not in the list
```


Combining `in` and `list.index()`:

```
numbers = [0, 1, 1, 2, 3, 5]
```

```
if 5 in numbers:
```

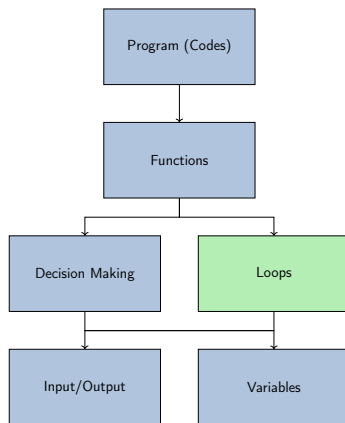
```
    print("The index of 5 in the list is", numbers.index(5))
```

```
# Output: The index of 5 in the list is 5
```

The `sort()` list function sorts a list's contents.

```
numbers = [6, 5, 1, 2, 3]
print(numbers, "length:", len(numbers))
# Output: [6, 5, 1, 2, 3] length: 5
print(numbers[0])
# Output: 6
numbers.sort() # Sort the list
print(numbers, "length:", len(numbers))
# Output: [1, 2, 3, 5, 6] length: 5
print(numbers[0])
# Output: 1
```

Contents



Loops

What do you do if you want to do something repeatedly in code?

```
print("Count:", 10)
print("Count:", 9)
print("Count:", 8)
print("Count:", 7)
print("Count:", 6)
print("Count:", 5)
print("Count:", 4)
print("Count:", 3)
print("Count:", 2)
print("Count:", 1)
print("Done.")
```

Let's turn this into a loop.

Loops - while

Example:

```
i = 10 # Initialising i as 10
while i > 0:
    print("Count:", i)
    i = i - 1
print("Done.")
```

Let's run through it together.

Loops - while

Example:

```
i = 10
```

```
while i > 0: # i is 10, which is larger than 0
```

```
    print("Count:", i)
```

```
    i = i - 1
```

```
print("Done.")
```

Loops - while

Example:

```
i = 10
while i > 0:
    print("Count:", i) # Count: 10
    i = i - 1
print("Done.")
```

Loops - while

Example:

```
i = 10
```

```
while i > 0:
```

```
    print("Count:", i)
```

```
    i = i - 1 # i goes from 10 to 9, then we go back up
```

```
print("Done.")
```


Loops - while

Example:

```
i = 10
while i > 0: # i is 9, which is larger than 0
    print("Count:", i)
    i = i - 1
print("Done.")
```

Loops - while

Example:

```
i = 10
while i > 0:
    print("Count:", i) # Count: 9
    i = i - 1
print("Done.")
```

Loops - while

Example:

```
i = 10
```

```
while i > 0:
```

```
    print("Count:", i)
```

```
    i = i - 1 # i goes from 9 to 8, then we go back up
```

```
print("Done.")
```

Loops - while

Example:

```
i = 10
```

```
while i > 0: # i is 8, which is larger than 0
```

```
    print("Count:", i)
```

```
    i = i - 1
```

```
print("Done.")
```

Loops - while

Example:

```
i = 10
while i > 0:
    print("Count:", i) # Count: 8
    i = i - 1
print("Done.")
```

Loops - while

Example:

```
i = 10
```

```
while i > 0:
```

```
    print("Count:", i)
```

```
    i = i - 1 # i goes from 8 to 7, then we go back up
```

```
print("Done.")
```

Loops - while

Example:

```
i = 10
```

```
while i > 0: # i is 7, which is larger than 0
```

```
    print("Count:", i)
```

```
    i = i - 1
```

```
print("Done.")
```

This goes on and on...

Loops - while

Example:

```
i = 10
```

```
while i > 0: # i is 1, which is larger than 0
```

```
    print("Count:", i)
```

```
    i = i - 1
```

```
print("Done.")
```


Loops - while

Example:

```
i = 10
while i > 0:
    print("Count:", i) # Count: 1
    i = i - 1
print("Done.")
```

Loops - while

Example:

```
i = 10
```

```
while i > 0:
```

```
    print("Count:", i)
```

```
    i = i - 1 # i goes from 1 to 0, then we go back up
```

```
print("Done.")
```

Loops - while

Example:

```
i = 10
```

```
while i > 0: # i is 0, which is NOT larger than 0, so we exit
```

```
    print("Count:", i)
```

```
    i = i - 1
```

```
print("Done.")
```

Loops - while

Example:

```
i = 10
while i > 0:
    print("Count:", i)
    i = i - 1
print("Done.") # "Done." is printed
```

Loops - while

We can also apply boolean values to while loops.

```
equal_to_5 = False
count = 0
while not equal_to_5:
    if count == 5:
        equal_to_5 = True
    count = count + 1
print("Done.") # "Done." is printed
```

Loops - for

Example:

```
for i in range(10):  
    print("Count:", i)  
print("Done.")
```

Python range

Python range is a thing of mystery. When you do `range(n)`, where `n` is an integer, Python generates a *range* of integers from 0 to `n - 1`.

Loops - for

Not getting the loop?

```
for i in range(10):  
    print("Count:", i)  
print("Done.")
```

is equivalent to

```
i = 0  
while i < 10:  
    print("Count:", i)  
    i = i + 1  
print("Done.")
```

Both loops go from 0 to 10, and give identical output.

Loops - for

Another example:

```
for i in range(5):  
    print(i*i, end=" ") # Print the square, end with a space  
print() # Add new line at the end  
# Output: 0 1 4 9 16
```


Loops - for

Let's combine lists with a for loop.

```
num = [1, 5, 9, 12, 4, 800]
```

```
for i in range(len(num)):
```

```
    print(num[i], end=" ") # Print num[i], end with a space
```

```
print() # Add new line at the end
```

```
# Output: 1 5 9 12 4 800
```

This is how we go through a list.

Loops - for

Instead of using the index, there is another way to go through a list:

```
num = [1, 5, 9, 12, 4, 800]
for i in num:
    print(i, end=" ")
print() # Add new line at the end
# Output: 1 5 9 12 4 800
```

The output is identical to the previous example.

Loops - for

It also works for lists of other types.

```
word = ["h", "k", "u", "s", "t"]  
for w in word:  
    print(w, end="")  
print() # Add new line at the end  
# Output: hkust
```

Lists

Lists are represented with `[]` to hold multiple variables, where the i^{th} item is at index $i - 1$.

Lists with functions

If a list is called `l`, one can:

- print the list with `print(l)`.
- get the length of `l` with `len(l)`.
- get/edit the element at index `i` with `l[i]`.

Lists functions

If a list is called `l`, one can:

- append a value `v` to `l` with `l.append(v)`.
- insert a value `v` to `l` at index `i` with `l.insert(i, v)`.
- remove the first occurrence of a value `v` with `l.remove(v)`.
- reverse the list with `l.reverse()`.
- count the occurrence of value `v` with `l.count(v)`.
- use the `in` operator to check if a value `v` is in a list.
e.g.: `if v in l:`
- get the index of the first occurrence of a value `v` with `l.index(v)`.
- sort the list with `l.sort()`.

while loops

```
while condition:  
    # Do code
```

Code in the `while` block are run while the condition is fulfilled.
Do make sure that the `while` loop can be exited.

Summary

for loops and range

```
n = 5 # Example
for i in range(n):
    # Do code with each number from 0 to n - 1
```

`range(n)` returns a range of integers that starts from 0 and ends at $n - 1$.

for loops and lists

```
l = [...] # A list with items
for i in l:
    # Do code with each item in the list
```

for loops can be directly applied onto lists.

The End
Thank you!
Made in L^AT_EX
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