

Discussion 01

Control, Environment Diagrams

Aditya Balasubramanian

`aditbala [at] berkeley [dot] edu`

Announcements

- Homework 1 is due Thursday 1/26 @ 11:59pm.
- Come to drop-in office hours to work with the staff & other students.
- Join the office hours queue when you get there: oh.cs61a.org.
- Request an extension if you need it: go.cs61a.org/extensions.

All Slides can be found on

teaching.aditbala.com

Control



Booleans

Falsey	Truthy
<code>False</code>	<code>True</code>
<code>None</code>	Everything else
<code>0</code>	
<code>[]</code> , <code>""</code> , <code>()</code> , <code>{}</code>	

Boolean Operators

- `not <conditional expression>`
 - returns opposite of `<conditional expression>`
 - `not (1 == 2) -> True`
- `<conditional expression> or <conditional expression>`
 - returns the first **Truthy** value it finds, `False` if none
 - `0 or None or 1 -> 1`
- `<conditional expression> and <conditional expression>`
 - return first **Falsy** value, or last value if everything is true
 - `40 and 0 and True -> 0`
 - `40 and 1 and True -> True`

Short Circuiting

- Sort of like making an assumption
 - If I'm broke, then I don't need to check the price of boba since I'll never be able to buy it lol 😬
- `and` will stop at the first **Falsey** value and return it
- `or` will stop at the first **Truthy** value and return it
- Why is this important?
 - May not need to evaluate all expressions. Even if there is an expression that errors, e.g. `1/0`, `and` / `or` expression might short circuit before it reaches error

Boolean Examples

- `0 or 435 or False`
 - returns `435`
- `True and "Hello" and 0`
 - returns `0`
- Short Circuiting
- `3 and 1/0 and False`
 - returns `Error`
- `3 and False and 1/0`
 - returns `False`

If Statements

- How to use `<conditional expressions>` to execute/skip lines of code?

```
if <conditional expression>:  
    <suite of statements>  
elif <conditional expression>:  
    <suite of statements>  
else:  
    <suite of statements>
```

- Colons after `if`, `elif`, `else` statements
- `else` doesn't need `<conditional expression>`

If Statements Example

```
wallet = 0

if wallet > 0:
    print('you are not broke')
else:
    print('you are broke')
if wallet == 0:
    print(0)
```

If Statements Example

```
wallet = 0

if wallet > 0:
    print('you are not broke')
else:
    print('you are broke')
if wallet == 0:
    print(0)
```

```
you are broke
0
```

General Tips for Approaching Problems

- Do not immediately start coding
 - Ensure you understand the problem
 - Have an idea of what you want to code
- Groupwork
 - Bounce ideas off of each other!
 - Share any ideas, questions, or misconceptions
- Reading the problem
 - Please read the entire problem
 - Hints are very useful
 - Doctests are SUPER useful

Worksheet

While Loops

- How to execute a statement multiple times in a program?

```
while <conditional clause>:  
    <statements body>
```

- program executes until `<conditional clause>` is false
- In other words, only run when `<conditional clause>` evaluates to `true`

While Loop Examples

```
x = 3
while x > 0:
    print(x)
    x -= 1
```

While Loop Example

```
x = 3
while x > 0:
    print(x)
    x -= 1
# x = x - 1
```

```
3
2
1
```


While Loop Example

- What is wrong with this while loop

```
x = 3
while x > 0:
    print(x)
```

- This will result in an infinite loop
- Make sure you are modifying the condition in the while loop

Enviroment Diagrams



Enviroment Diagrams

- What are they?
 - A way to model how our program runs line by line
 - Keep track of variables, function calls and what they return, etc.
- Why use them?
 - Can help us understand where there is a bug in program (debugging)
 - Useful for other questions (WWPD, coding)
 - Exam points!

Important Concepts

- Expressions
 - Evaluate to values
 - `1 + 1 -> 2`
- Assignment Statements
 - Bind (left side) **names** to (right side) **values**
 - **Names**
 - variable names
 - **Values**
 - Evaluate right side before binding
 - `x = 2 * 2`
 - `x -> 4`
 - doesn't return anything

Frames

- Global Frame always exists
- Frames list the bindings of variables and their corresponding value
- Used to look up the value of a variable

Question 7: Assignment Diagram

```
x = 11 % 4
```

```
y = x
```

```
x **= 2
```

def statements

- `def` statements are used to bind **function objects** to a **variable**
- Only bind, **NO** execution until function is called
 - `def foo():` -> define function called `foo` with no parameters
 - `foo()` -> execute `foo`
- Binding name is function name
- Parent function is frame where function is defined
- Keep track of *name, parameters, parent frame*

Python 3.6
([known limitations](#))

```
1 x = 3
2 def square(x):
3     return x ** 2
```

[Edit this code](#)

Frames Objects

The diagram illustrates the state of memory during function definition. On the left, under 'Frames', is the 'Global frame' which contains a variable 'x' with the value 3 and a variable 'square'. On the right, under 'Objects', is the function object 'func square(x) [parent=Global]'. A blue arrow points from the 'square' variable in the 'Global frame' to the function object, indicating that the variable 'square' now points to the newly created function object.

Worksheet

Thank you!

Attendance (linked on website) -> teaching.aditbala.com

Anon Feedback -> <https://tinyurl.com/adit-anon>