

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 the heading 'Frames', is a box representing the 'Global frame'. Inside this frame, there are two entries: 'x' with the value '3', and 'square' with a blue dot. An arrow points from this blue dot to the right, under the heading 'Objects'. On the right, there is a function object represented as 'func square(x) [parent=Global]'. This visualizes how the 'square' variable in the global frame is bound to a function object whose parent is the global frame.

Worksheet

Thank you!

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

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