Discussion 01

Control, Environment Diagrams

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Announcements



Contro



Booleans

| Falsey | | Truthy |
|--------|----------|-----------------|
| False | | True |
| None | | Everything else |
| 0 | | |
| [], "" | , (), {} | |

Some <conditional expressions> that will evaluate to either False / True most of the time, with a few exceptions later into the semester.

Boolean Operators

- not <conditional expression>
 - o returns opposite of <conditional expression>
 - o not (1 == 2) -> True
- <conditional expression> or <conditional expression>
 - o returns the first **Truthy** value it finds, False if none
 - 0 or None or 1 -> 1
- <conditional expression> and <conditional expression>
 - o return first **Falsey** value, or last value if everything is true
 - 40 and 0 and True -> False
 - 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
 - o returns 435
- True and "Hello" and 0
 - o returns 0
- Short Circuiting
- 3 and 1/0 and False
 - o returns Error
- 3 and False and 1/0
 - o 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
```

[ADD EXAMPLES]

While Loops

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

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

• program executes until <conditional clause> is false

[ADD EXAMPLES]

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
 - 0 1 + 1 -> 2
- Statements
 - Bind names to values
 - Names
 - def statements, assignment statements, variable names
 - Values
 - numbers, strings, functions, or other objects
 - o x = 2
 - o doesn't return anything

Interactive Example

```
x = 3

def square(x):
    return x ** 2

square(2)
```

- Let's create an environment diagram for this program!
- Start from top, go to bottom

Frame

- Frames are objects that list bindings of variables and values
 - tell us how to look up bindings
- **Global Frame** exists by default
- Assignment statement
 (denoted by =) creates
 binding of variable x and
 values 3



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
 - o 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

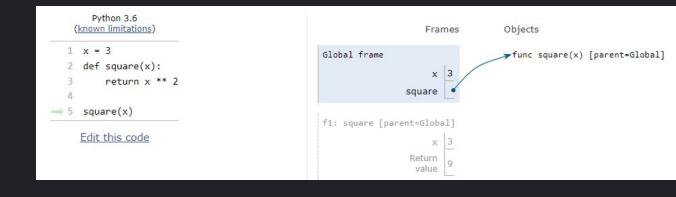
Frames Objects

Global frame
x 3
square
```

Call Expressions

- Syntax: function_name(arg1, arg2, ...)
- Create new frame for call expression
- Steps for evaluating:
 - Evaluate operator (function)
 - See if it exists
 - 2. Evaluate operands (args)
 - simplify args
 - 3. Apply operator to the operands

 Slides by Aditya Balasubramanian



Thank you!