



Using the Python Programming Language



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Cyber Seminar 01/10/2019

- Do you have previous programming experience?
 - No, Python will be my first programming language.
 - Yes, I have a little experience.
 - Yes, I have a lot of experience.
 - Other (please comment in the chat)
- Why are you interested in learning about Python?
 - I want to learn how to write my own programs.
 - I want my research group to use Python for analytics.
 - I heard Python is popular and I want to know why.
 - Other (please comment in the chat)

Poll Questions

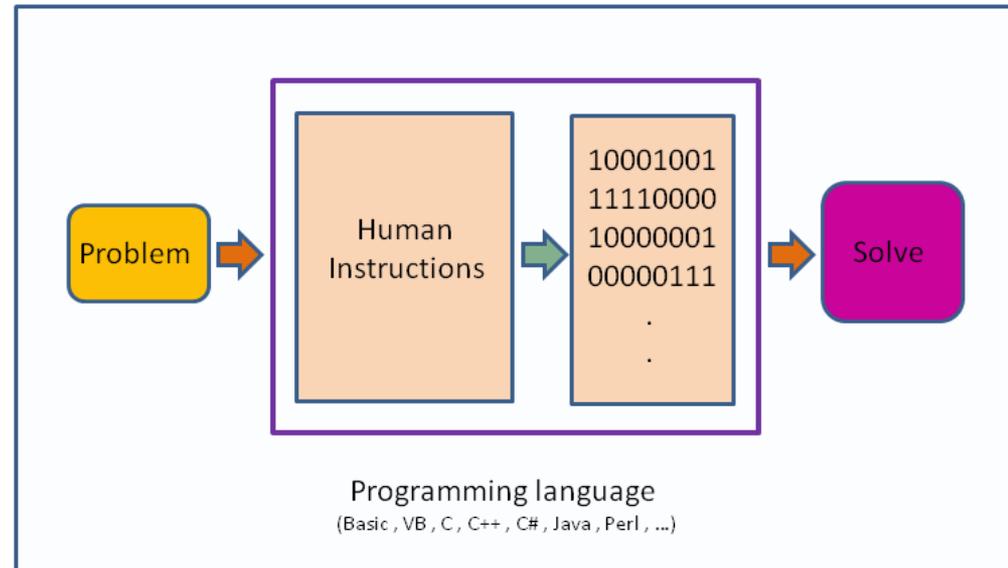
- Speaker introduction
- What is Python?
- Why should I care about Python?
- What are some things I can do with Python?
- How do I write Python code?
- What are some good tips for beginners?
- Questions/Discussion

Today's Talk

- **(2018 - now)** Natural Language Processing (NLP) Specialist with VINCI!
- **(2016 - 2018)** Research Specialist at University of Arizona
 - Worked with Python every day
 - Presenter and active member of Tucson Python Meetup
 - Volunteered with Software Carpentry Foundation and other education outreach efforts
- **(2016)** M.S. in Human Language Technology
- **(2014)** Started using Python for NLP & Computational Linguistics
- **(Pre-2014)** Sad person using Perl for CompLing (sorry to any Perl fans...)

About me

- A programming language
- Released in 1991
- High level
 - E.g. Dynamic typing, cycle-detecting garbage collection
- Interpretive language*
 - You don't need to compile it, like Java
- Flexible programming paradigms*
 - Imperative, Object Oriented, Functional
- Plays nicely with C
 - This helps scale things



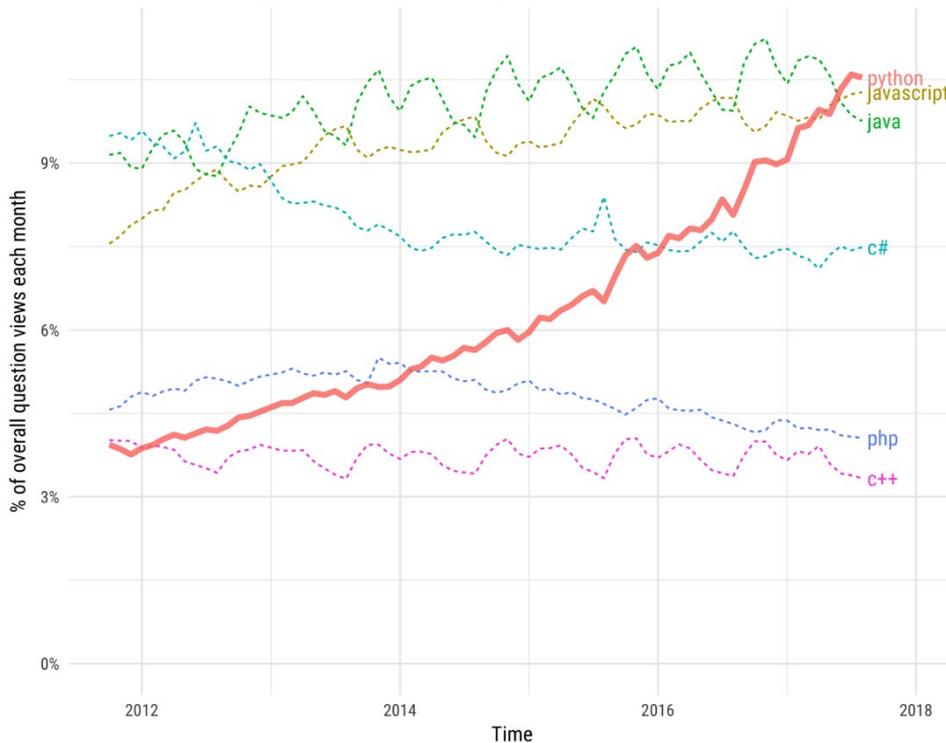
What is Python?

- “Python has a solid claim to being the fastest-growing major programming language”

Growth of major programming languages

Based on Stack Overflow question views in World Bank high-income countries

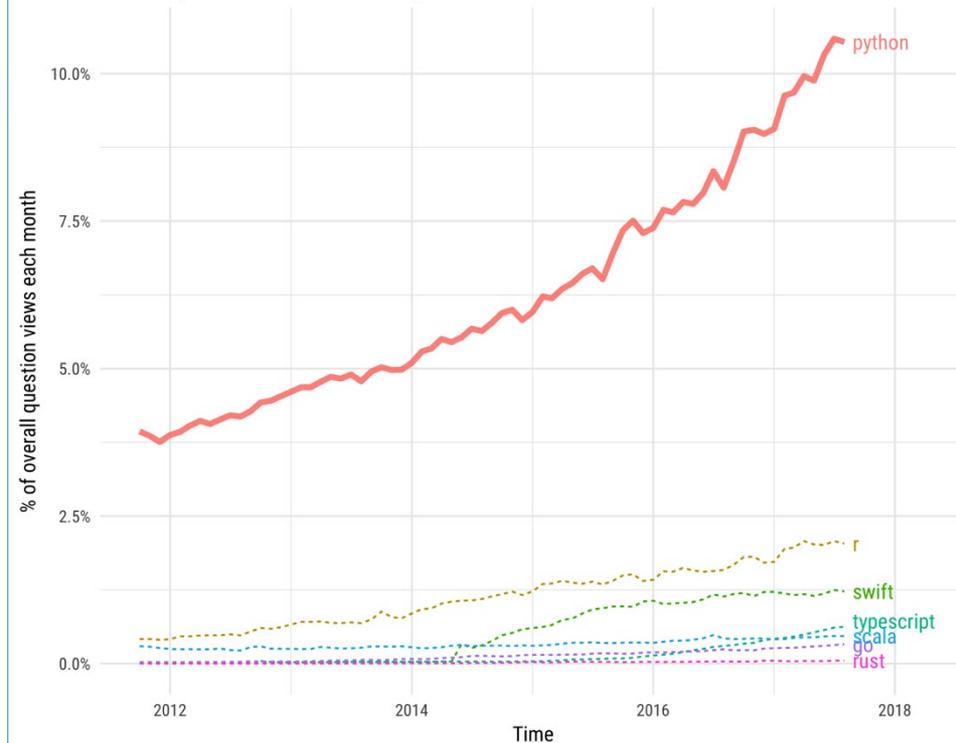
A



Python compared to smaller, growing technologies

Based on question traffic in World Bank high-income countries

B



[1] <https://stackoverflow.blog/2017/09/06/incredible-growth-python/>

Why Python?

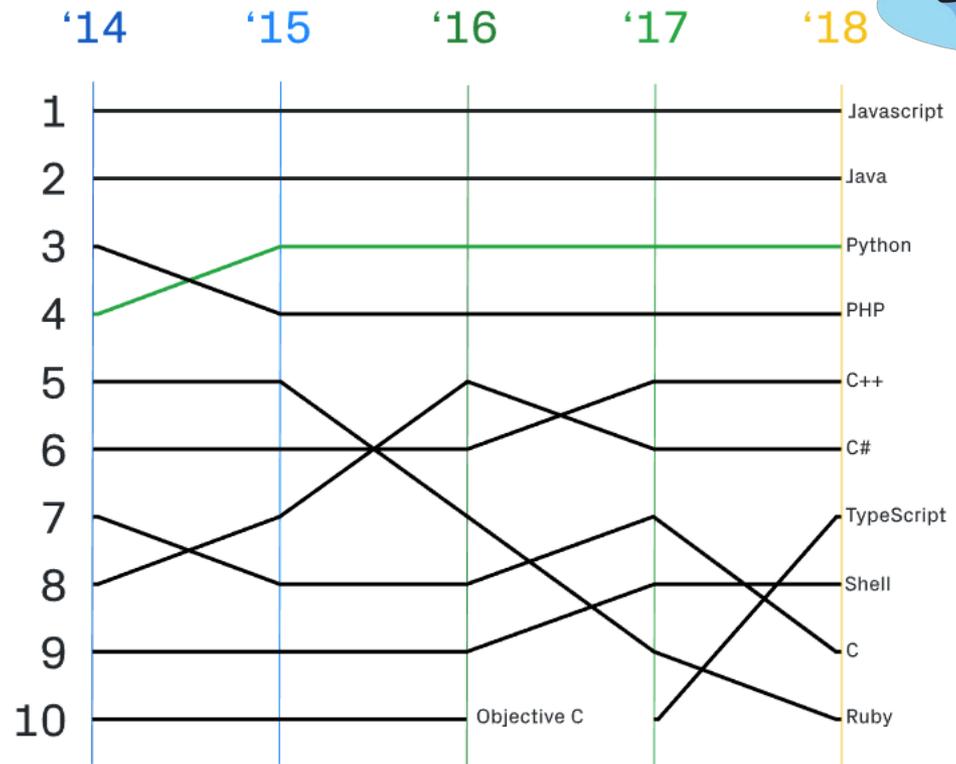


GitHub

Top languages over time

You're coding on GitHub in hundreds of programming languages, but JavaScript still has the most contributors in public and private repositories, organizations of all sizes, and every region of the world.

This year, TypeScript shot up to #7 among top languages used on the platform overall, after making its way in the top 10 for the first time last year. TypeScript is now in the top 10 most used languages across all regions GitHub contributors come from—and across private, public, and open source repositories. *



[2] <https://octoverse.github.com/projects#languages>

Why Python?

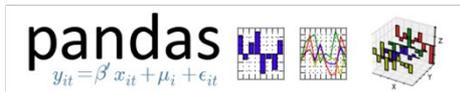
- Simple syntax

Python	Other language
if a is not 5 :	if (a != 5) { ...
if a is 5 :	if (a == 5) {
while (a is True and b is False) : python code	while (a == true && b == false) {other code }
while (a is True or B is False) :	while (a == true b == false) { ...
print "hi there"	console.log("hi there")
not penjee.isWater(ahead)	! penjee.isWater(ahead)

- High power scientific frameworks



IP[y]: IPython
Interactive Computing



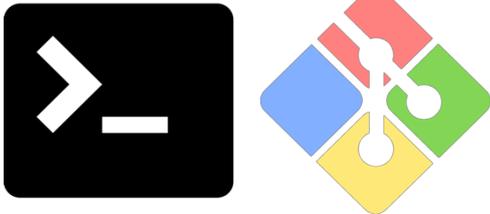
Why Is Python Popular?

- Data analysis & data mining
- Data visualization
- Read and write to databases
- Natural language processing / text processing
- Machine learning
- Much more!

How you might use Python for research

- Python installation
 - Many computers now come with Python pre-installed
 - Anaconda

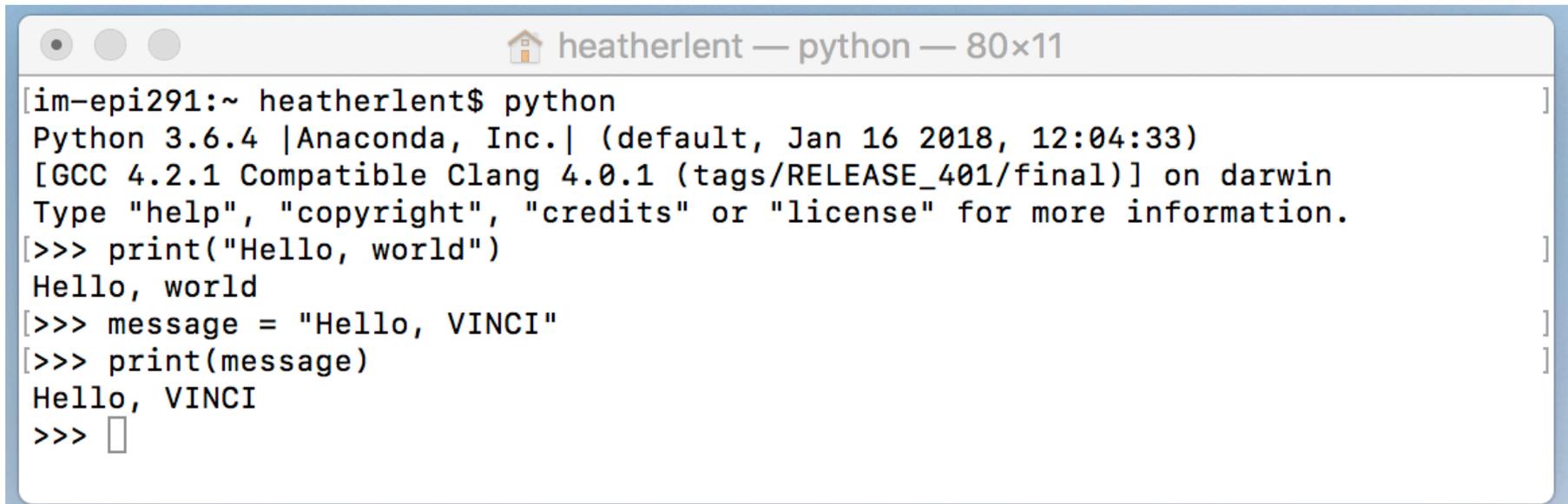
- A shell of your choice
 - This is how you will **execute** Python code
 - Terminal, GitBash, Powershell, etc.



- Text Editor or IDE
 - This is where you will **write** Python code
 - Sublime, Notepad++, PyCharm, etc.

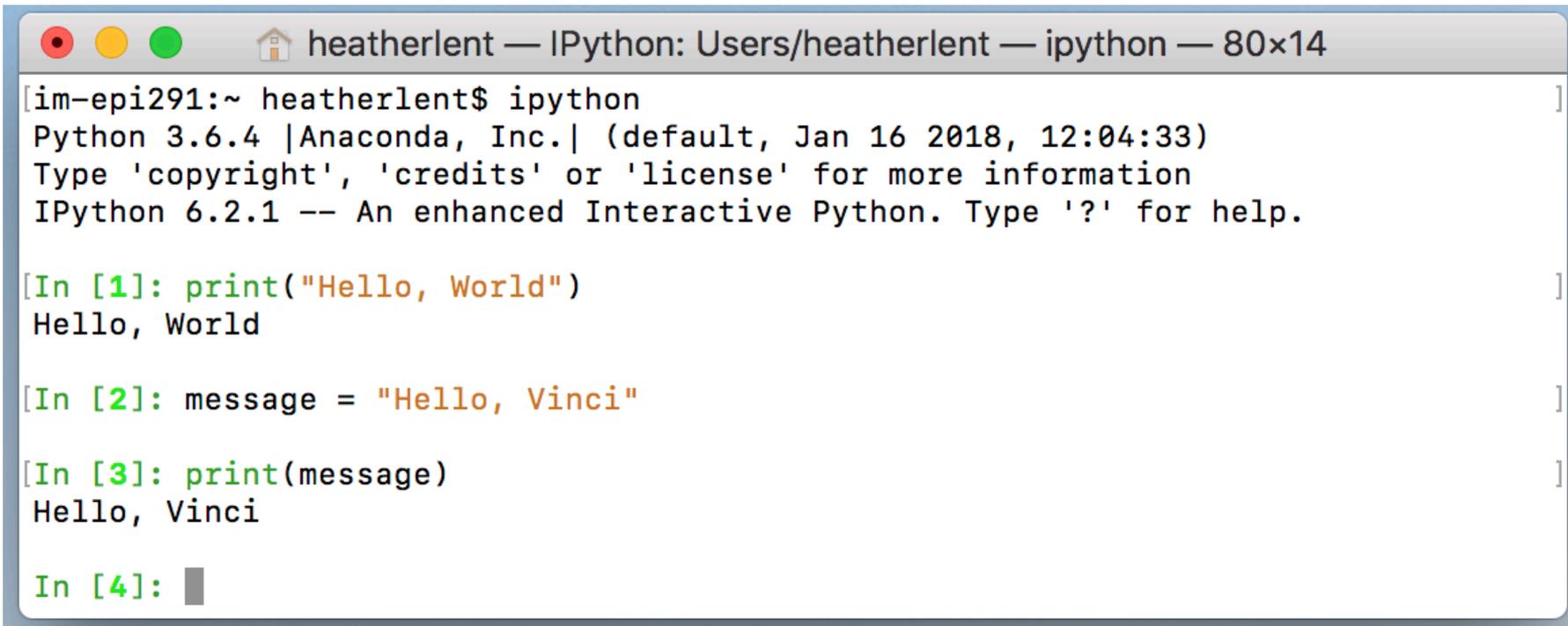
```
database.py
54
55 class Revision(object):
56     """
57     Represents one revision of a page.
58     This is useful for editing particular revision of pages or creating
59     new revisions. It's also used for the diff system and the revision
60     log.
61     """
62     query = session.query_property()
63
64     def __init__(self, page, text, change_note='', timestamp=None):
65         if isinstance(page, (int, long)):
66             self.page_id = page
67         else:
68             self.page = page
69             self.text = text
70             self.change_note = change_note
71             self.timestamp = timestamp or datetime.utcnow()
72
73     def render(self):
74         """Render the page text into a genshi stream."""
75         return parse_creole(self.text)
76
77     def __repr__(self):
78         return '<class Revision: %s (' % (
79             self.__class__.__name__,
80             self.page_id,
81             self.revision_id
82         )
83
84
```

What do I need to get started?

A terminal window titled "heatherlent — python — 80x11" with a home icon. The terminal shows the following text:

```
[im-epi291:~ heatherlent$ python  
Python 3.6.4 |Anaconda, Inc.| (default, Jan 16 2018, 12:04:33)  
[GCC 4.2.1 Compatible Clang 4.0.1 (tags/RELEASE_401/final)] on darwin  
Type "help", "copyright", "credits" or "license" for more information.  
[>>> print("Hello, world")  
Hello, world  
[>>> message = "Hello, VINCI"  
[>>> print(message)  
Hello, VINCI  
>>> ]
```

Hello, World (1)

A terminal window titled "heatherlent — IPython: Users/heatherlent — ipython — 80x14". The window shows a Python 3.6.4 shell with IPython 6.2.1. The user has entered three commands: 1) print("Hello, World") which outputs "Hello, World"; 2) message = "Hello, Vinci"; 3) print(message) which outputs "Hello, Vinci". The prompt "In [4]:" is visible with a cursor.

```
heatherlent$ ipython
Python 3.6.4 |Anaconda, Inc.| (default, Jan 16 2018, 12:04:33)
Type 'copyright', 'credits' or 'license' for more information
IPython 6.2.1 -- An enhanced Interactive Python. Type '?' for help.

In [1]: print("Hello, World")
Hello, World

In [2]: message = "Hello, Vinci"

In [3]: print(message)
Hello, Vinci

In [4]:
```

Hello, World (2)

String

```
myString = "A string is in quotes. Usually  
text. Can contain numbers 123, and symbols!"
```

Int

```
myInteger = 3
```

List

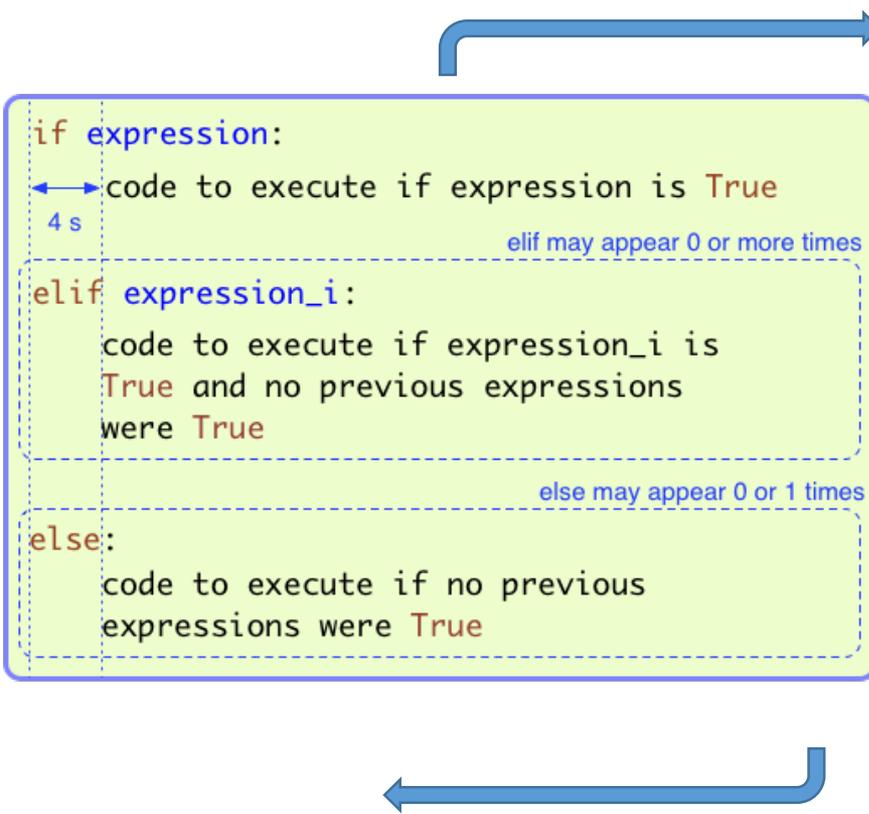
```
myListOfStrings = ["one", "two", "three"]  
myListOfInts = [1, 2, 3, 4]
```

Dictionary (value, key pairs)

```
myDictionary = {"one": 1, "two": 2}
```

Variables and types

if (elif, else)



```
if i==12:  
    print "Correct"
```

#a simple IF statement
#no brackets, but does use
#a colon to begin the block

```
if number<10:  
    print "too low"  
elif number>10:  
    print "too high"  
else:  
    print "just right"
```

#python uses elif as a contraction
#of ELSE IF

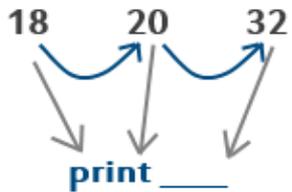
for

```
seq = [18, 20, 32]
```

```
for each x of seq
```

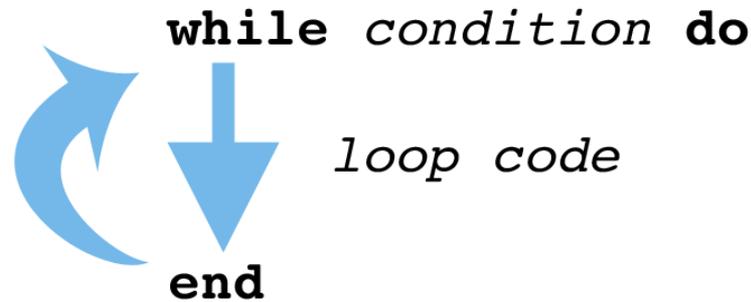
```
    print x
```

```
end
```



```
>>> cities = ['New York', 'Berlin', 'Seoul', 'London', 'Moscow', 'Tucson']
>>> for myCities in cities:
...     print (myCities)
...
New York
Berlin
Seoul
London
Moscow
Tucson
>>> message = 'Hello'
>>> for i in message:
...     print (i)
...
H
e
l
l
o
>>> █
```

while



We want to make sure the loop runs the first time.

```
answer = "no"
while answer == "no":
    answer = input("Are we there? ")
print("We're there!")
```

The loop condition

The loop body is the indented code following the "while" line.

The loop body is just one line of code in this example, but the loop body can be many lines of code. It might even include branches and other loops.

Demonstration

- Python distribution? – Anaconda
- Python 2 or Python 3?
 - <https://pythonclock.org/>
- Play with `iPython`
- Google your errors
- Get comfortable with Python documentation
- Check out VA Pulse for Python in VINCI
- Learn some Bash scripting and Git

My Tips for Beginners

- Google
- Stack Overflow (<https://stackoverflow.com/>)
- Sentdex (<https://www.youtube.com/user/sentdex>)
- O'Reilly books
(<https://www.oreilly.com/programming/free/python-for-scientists.csp>)

Additional Resources

Questions? Discussion!

Thank you 😊