











A man with shoulder-length brown hair, wearing a patterned long-sleeved shirt, stands in a vineyard. Behind him is a large, colorful building constructed from many horizontal layers of different colored bricks (red, yellow, blue, purple, white). The building has a red roof. The background shows a green field and distant hills under a hazy sky.

A PROGRAM CONSIST  
OF FUNCTION CALLS  
LIKE A LEGO HOUSE  
CONSIST OF BRICKS



# Why is programming fun?

Fred Brooks

- First is the sheer joy of making things
- Second is the pleasure of making things that are useful
- Third is the fascination of fashioning complex puzzle-like objects of interlocking moving parts
- Finally, there is the delight of working in such a tractable medium. The programmer, like the poet, works only slightly removed from pure thought-stuff.



# Syntax & problem solving

- In this course you learn both how to write Python code
- And how to solve problems

# PFTW: String, loops and lists

- **At the end of the lecture you know:**
  - that a program is made up of function calls like a Lego house is made up of Lego bricks
  - there are a number of string functions out there for you to use solving problems
  - how to pick out a slice of a string or just a single letter
  - that you can use a for loop to look at each letter in a string and do something with it
  - there is something more that meets the eye under the hood of Python!

# Strings & Avatar

- “Sometimes your whole life boils down to one insane move!” (Jake Sully, Avatar, 2009)
- CompSci 6/101, Spring 2012 Oftentimes the core logic of a program boils down to one big string move!

# Problems that are solved via strings

- **Problem 1: Web crawler**
  - 1) Get all the links from a web page.
  - 2) Go to the web pages found and do 1)
- **Problem 2: Password checker**
  - Are there 8 characters?
  - Is there at least one number?
  - Is there at least one capital letter?
  - Is there at least one symbol?
- **Problem 3: APT “Forming Acronyms”**
  - How do you pick out each word?
  - How do you pick out the first letter in a word?



**Regular Universe**



**Python Universe**

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# String Operators

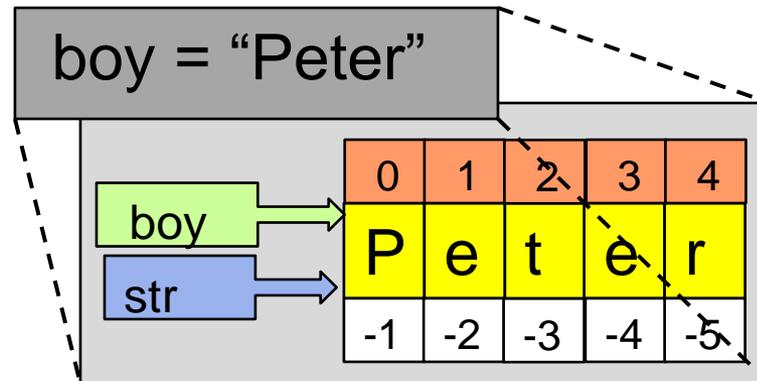
Operator	
=	Get / assign
==	Equals
.	Call function
<>	Less than, greater than Based on ASCII codes!
in	Answer true/false if string is inside another string



Type	*	+
str	Repeat	Append
int	Multiplication	Addition (sum)

# Under the hood of strings

- Python sees a String as a sequence
- Python assigns each character a 'box' and two number



```
boy[ 0 ]  
P  
  
boy[ -2 ]  
e
```

```
boy[ 0:2 ]  
Pe  
  
boy[ 2:4 ]  
te
```

# Sir Tim Berners-Lee



I want you to realize that, if you can imagine a computer doing something, you can program a computer to do that.

Unbounded opportunity... limited only by your imagination. And a couple of laws of physics.

- **TCP/IP, HTTP**
  - **How, Why, What, When?**

# String functions

- `res = 'Team Blue Devil wins'`

Function	Description	Result with string <code>res = 'Team Blue Devils'</code>
<code>res.upper()</code>	returns string upper case version of string <code>res</code>	TEAM BLUE DEVILS
<code>res.count('am')</code>	returns int number of (non-overlapping) occurrences of <code>sub</code> in <code>s</code>	1
<code>res.find('m')</code>	returns int first index at which <code>sub</code> occurs in <code>s</code> or -1 if no occurrence	3
<code>res.split()</code>	returns list of <code>s</code> split on whitespace	['Team', 'Blue', 'Devils']
<code>res.split('l')</code>	returns list of <code>s</code> split on <code>sep</code> , a delimiter	['Team B', 'ue Devi', 's']
<code>res.strip()</code>	returns copy of <code>res</code> withOUT leading and trailing whitespace	Team Blue Devils
<code>len( res )</code>	returns the number of characters in the string (including white spaces)	16
<code>res.isupper()</code>	returns true if all the characters are in upper case	False

# Sergey Brin

- Simple ideas sometimes can change the world [wikipedia]

➤ Works because of scale

<http://www.bloomberg.com/video/66114966/>

- Co-created pagerank (Larry Page), which evaluates links to a page and the importance of those links, based on the importance of the page from which the links come which ...!

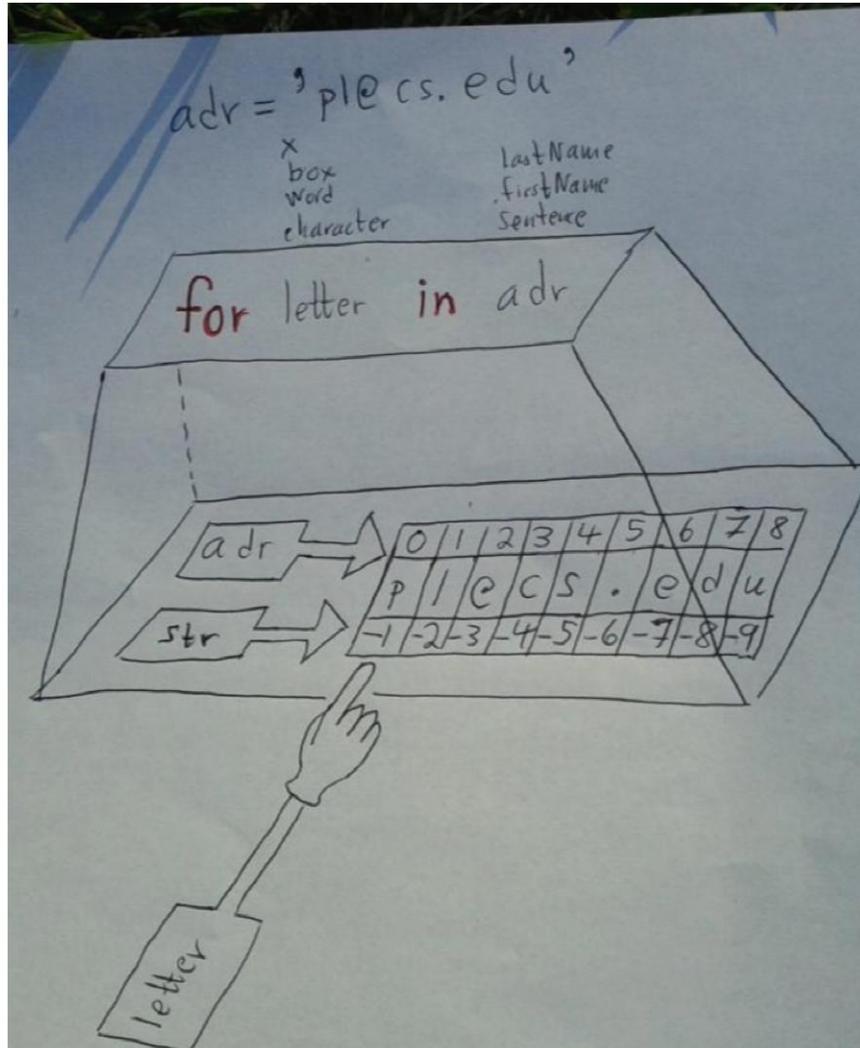
[http://upload.wikimedia.org/wikipedia/commons/0/00/Sergey\\_Brin\\_2008.jpg](http://upload.wikimedia.org/wikipedia/commons/0/00/Sergey_Brin_2008.jpg)



# Loops

Loops	
for	while
<code>for</code> element <code>in</code> sequence: do this..... .....	<code>while</code> statement: do this..... .....
For each element in the sequence please do the following...	While the statement is true please do the following...
Great for list with well known number of elements	Great for all other cases with unkown number of elements

# Under the hood of loops



- **Loops is the answer to how you go through a string**

Pick out all the capital letters of the following sentence:  
red = 'Most Wanted Criminal'

```
result = ""  
for char in red:  
    if char.isupper():  
        result = result + char  
  
print result
```

# PFTW: String, loops and lists

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