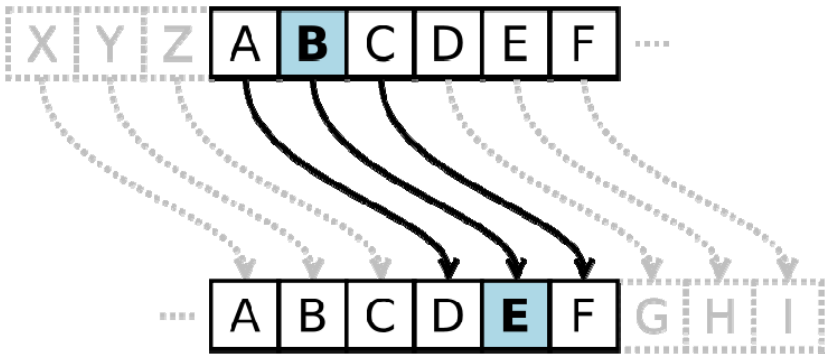
CompSci 101
Introduction to Computer Science



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Example – Software to Cheat (2015)

http://www.bbc.com/news/business-34324772

```
If car.isDriving() or car.onRoad():
    gofaster()
    emit_more()
    get_performance()
elif car.connectedToMonitor():
    beclean()
    register_as_wonderful()
else:
    act_randomly()
    engine_light_on()
```

Announcements

- No Reading or RQ until Oct 6
- Assignment 4 due Thursday
- APT 3 is due Today, no new APT out
- APT Quiz 1
- Exam 1 is Oct 4
  - Do practice Exam 1's by Thursday
  - Will review next time

- Today: problem solving with files
  - largest word in file, where is largest word

Lab this week….

- Continue working with files, read file in once:

```
Sean:Davis:men:soccer:72
Lexie:Brown:women:basketball:69
Jessica:Ho:women:tennis:65
```

- To this format:

```
[  ['Sean', 'Davis', 'men', 'soccer', '72'],
  ['Lexie', 'Brown', 'women', 'basketball', '69'],
 ['Jessica', 'Ho', 'women', 'tennis', '65'],
```

- Now ask many questions about the data…

Looping over and accumulating…

```
initialize
for variable in something:
    ask question about variable?
        accumulate
return answer
```

Loop over characters in strings, items in lists, lines in a file

Largest number in list
bit.ly/101f16-0927-1

```
def biggest(numbers):
    max = numbers[0]
    for num in numbers:
        if num > max:
            max = num
    return num
```

print biggest([8,3,9,1,5,7])
Returns 7? What is wrong?

More on lists

range(5) is [0,1,2,3,4]

range(2,6) is [2, 3, 4, 5]

alist = [“a”, “b”, “d”, “c”]

for i in range(len(list)):

x = “ “.join(alist) # alist must be list of strings

y = list(“peach”)

Problem Solving

- How do we count words in a file?
- How do we find the length of the longest word?

wordsInFile.py

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- Answer questions about computing the longest word in a file

More Problem Solving

- How do we find the longest word?
- How do we find where the longest word is?
- Do we read a file into a list of words? A list of lines of words?

Reading from Files, Writing to Files

- Programs generate data, store for access
  - Notes we take, notebooks we keep
  - Files we make our programs create and add to
- File concepts for reading and writing
  - Call open with a path to file, how to open?
  - Choice of reading, writing, appending
  - Read or Write (depending on "r", "a", "w")
  - Close the file when done

Reading from files: see Piglatin.py

- Open file for reading
  - Read lines: `for line in f:`
  - Read file: `st = f.read()`
  - Both get strings, convert as needed

- If fname not found?
- Type of f?
- Type of st?

```
def readFile(fname):
    f = open(fname)
    st = f.read()
    f.close()
    return st.split()
```

Code in Piglatin.py

```
def writeFile(words, fname):
    LINE_SIZE = 80
    f = open(fname,"w")
    wcount = 0
    for word in words:
        f.write(word)
        wcount += len(word)
        if wcount + 1 > LINE_SIZE:
            f.write('\n')
            wcount = 0
        else:
            f.write(' ')
    f.close()
```

Questions: File writing and Transform

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How to approach a 101 Assignment

- Programming compared to Cooking
  - Follow a recipe to create {food or masterpiece}?
  - Understand the whole project before coding
  - Know at least a few steps before coding

What do we learn from assignment?

- We will snarf to get started
  - We will modify Piglatin.py
  - We will create CaesarCipher.py
  - We might want to use parts of Piglatin.py for CaesarCipher.py

What does *Howto* say about Piglatin.py

- Lots of details on how to pigify a word
  - Ignore at first, make the structure of the program work
- We have to write four functions
  - Details on function headers/prototypes given
  - Details on function functionality given
- Types and values in main program
  - Work to understand the flow
  - Run the program, where do you start?

Making pigifyall work

- Make sure you understand this
  - What do you need to do so this works?
  - What is header, signature, prototype: `pigifyword`

```
def pigifyall(st):
    all = []
    for word in st.split():
        all.append(pigifyword(word))
    return ' '.join(all)
```

Making pigifyword work

- Once you know what pigifyword does, how do you implement it?
  - Review rules for piglatin
  - Review code for APT you hopefully did ☺

- Don't try to make every case work at once!
  - Start small and grow a working program.
  - How about first word is a vowel to begin …
  - Then add another case, …

If `pigifyword` is done … else …

- Get to `unpigifyall` and `unpigifyword`
  - Which will be easy? Why?
  - Can you do one easy case in `unpigifyword`?

- Why does it help to do one case at a time?
  - Builds confidence in reaching completion
  - Decreases time-to-completion: code works! Bugs easier to find.

In class Questions

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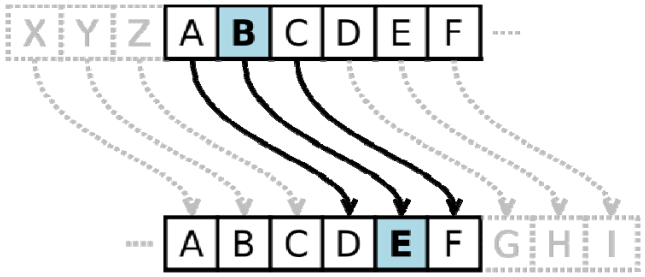
Cracking the Caesar Cipher

- First create CaesarCipher.py
  - Where do you start?
  - What's in the main program?
  - What's copied from Pigify.py



- What functions will you write first?
  - Where do you find this information?
  - What's not clear about it?

Lots of details in making this work

- How do you loop over characters in word?
  - Is there anything familiar here?
- How do you know if a character is
  - Alphabetic?
  - Uppercase or lowercase?
  - A vowel or a consonant?

- Once again: start simple, make something work, add functionality incrementally

How do you know encryption works?

- Is this a chicken and egg question?
  - Could you write decrypt first?
  - Isn’t decrypting by eyeball decryption just encrypting 26 times?

14 Pljbqfjbp fq'p bxpv ql zlrkq colj 1-10, yrq klq xitxvp
15 Qmkcrgkcq gr'q cyqw rm amslr dpmk 1-10, zsr lmr yjuywq
16 Rnldshldr hs'r dzrx sn bntms eqnl 1-10, ats mns zkvzxr
17 Sometimes it's easy to count from 1-10, but not always
18 Tpnfujnft ju't fbtz up dpvou gspn 1-10, cvu opu bmxbzt
19 Uqogvkogu kv'u gcua vq eqwpv htqo 1-10, dwv pqv cnycau

Can you call a function 26 times?

- Encrypt using 26 shift keys and … eyeball!

```
em = #encrypted message
for n in range(26):
    sem = encrypt(em,n)
    print n,sem
```

- Also write automatic decryption by determining which words are real words…

What do you output for assignment 4?

- Demonstrate with clear output that all parts of your program work.

- See new statement in red on the bottom of the howto page.