Objectives

- Indefinite Loop
- Broader Issue: Computer Science Education

Review

- How can you make a function have a default value for a parameter?
- What is a key difference between what happens when we pass a list to a function vs pass a different type (int, string, float) to a function?
- What are the tradeoffs in programmatically testing functions?

INDEFINITE LOOPS

Indefinite Loops

- `for` loops are ***definite*** loops
  - Execute a *fixed* number of times
- ***Indefinite*** loops: keep iterating until certain conditions are met
  - Depending on condition, no guarantee in advance of how many times the loop body will be executed

While Loop Syntax

```
while condition :
    statement1
    statement2
    …
    statementn
```

loop stops when condition is False

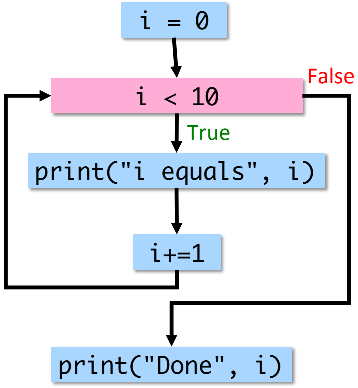
keyword

body of while loop

- Like a looped `if` statement
  - Execute statements **only** when condition is true

While Loop

```
i = 0
while i < 10 :
    print("i equals", i)
    i+=1
print("Done", i)
```



Questions:

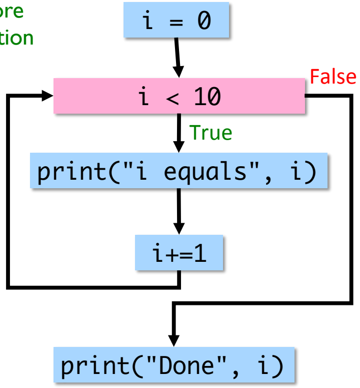
- How many times will `i` get printed out?
- How many times is the condition evaluated?
- What is the value of `i` after the loop?

while.py

While Loop

```
i = 0
while i < 10 :
    print("i equals", i)
    i+=1
print("Done", i)
```

Initialize i before using in condition



Questions:

- How many times will `i` get printed out?
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while.py

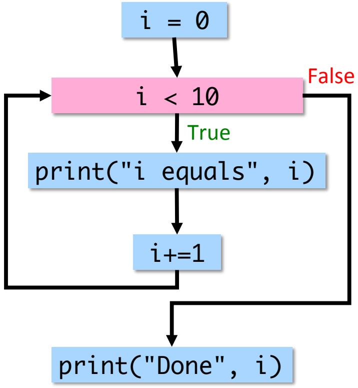
While vs. For Loops

- Any `for` loop can be translated into a `while` loop
  - But **NOT** vice versa
- `while` loops are more **powerful** than `for` loops

Convert to a for loop

We *can* convert this while loop into a for loop because it executes a ***fixed*** number of times.

```
i = 0
while i < 10 :
    print("i equals", i)
    i+=1
print("Done", i)
```



i = 0

i < 10

False

True

print("i equals", i)

i+=1

print("Done", i)

Comparing while and for

- What are the main differences between these loops?
- What are the advantages and disadvantages of each?

```
i = 0
while i < 10 :
    print("i equals", i)
    i+=1
print("Done", i)
```

```
for i in range(10):
    print("i equals", i)

print("Done", i+1)
```

whilevsfor.py

What Will This Loop Do?

```
count = 1
while count > 0:
    print(count)
    count += 1
```

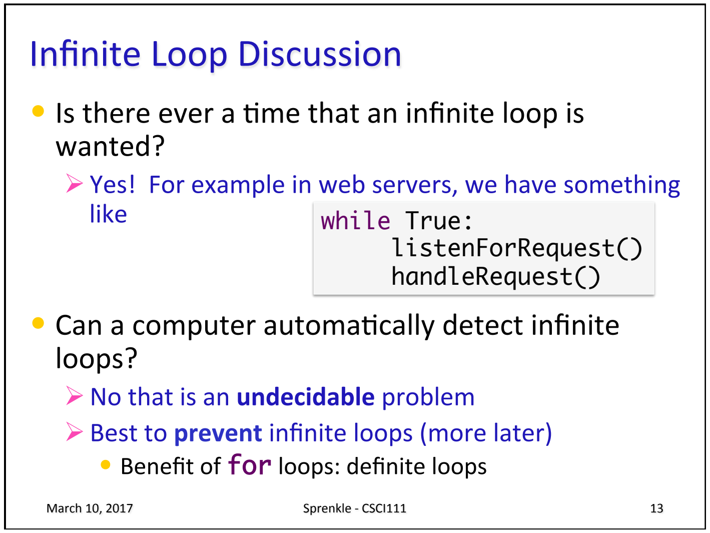
loop.py

Infinite Loop

- Condition will never be False so keeps executing

```
count = 1
while count > 0:
    print(count)
    count += 1
```

- To stop an executing program in Linux use
  - Control-C

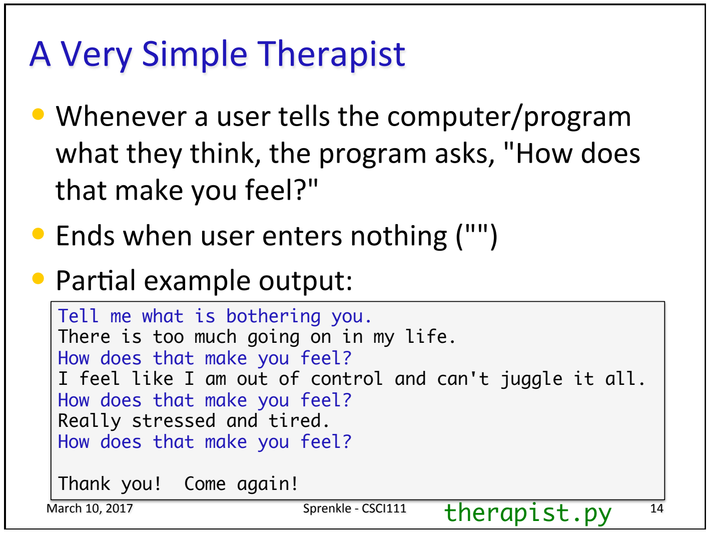


Infinite Loop Discussion

- Is there ever a time that an infinite loop is wanted?
  - Yes! For example in web servers, we have something like

```
while True:
    listenForRequest()
    handleRequest()
```

- Can a computer automatically detect infinite loops?
  - No that is an **undecidable** problem
  - Best to **prevent** infinite loops (more later)
    - Benefit of `for` loops: definite loops



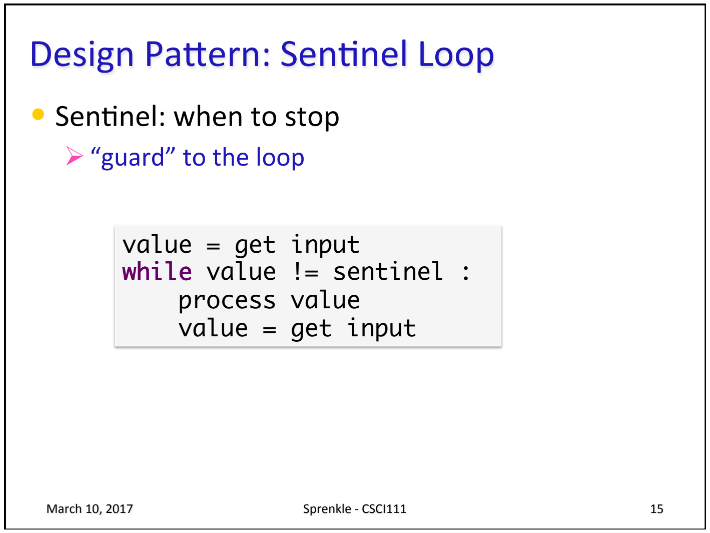
A Very Simple Therapist

- Whenever a user tells the computer/program what they think, the program asks, "How does that make you feel?"
- Ends when user enters nothing ("")
- Partial example output:

```
Tell me what is bothering you.
There is too much going on in my life.
How does that make you feel?
I feel like I am out of control and can't juggle it all.
How does that make you feel?
Really stressed and tired.
How does that make you feel?

Thank you!  Come again!
```

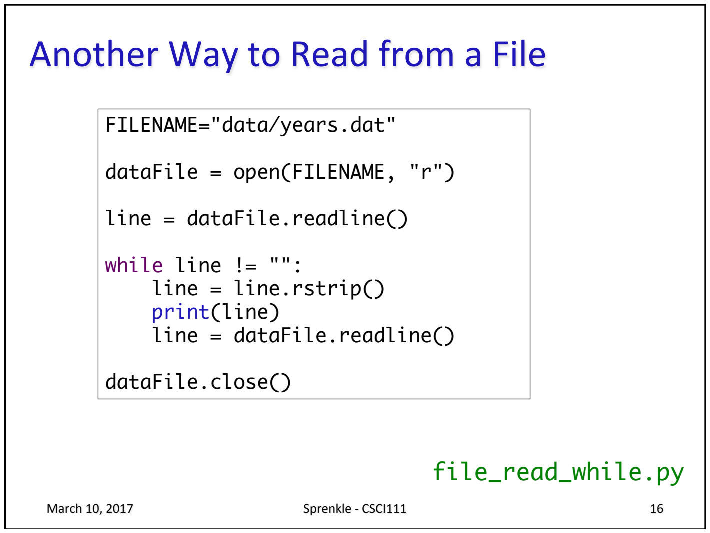
therapist.py



Design Pattern: Sentinel Loop

- Sentinel: when to stop
  - "guard" to the loop

```
value = get input
while value != sentinel :
    process value
    value = get input
```



Another Way to Read from a File

```
FILENAME="data/years.dat"

dataFile = open(FILENAME, "r")

line = dataFile.readline()

while line != "":
    line = line.rstrip()
    print(line)
    line = dataFile.readline()

dataFile.close()
```

file_read_while.py

Summary: While vs. For Loops

- Any `for` loop can be translated into a `while` loop
  - But **not** vice versa
- `while` loops are more **powerful** than `for` loops
  - Give an example of a `while` loop that can't be converted to a `for`

Broader Issue Groups

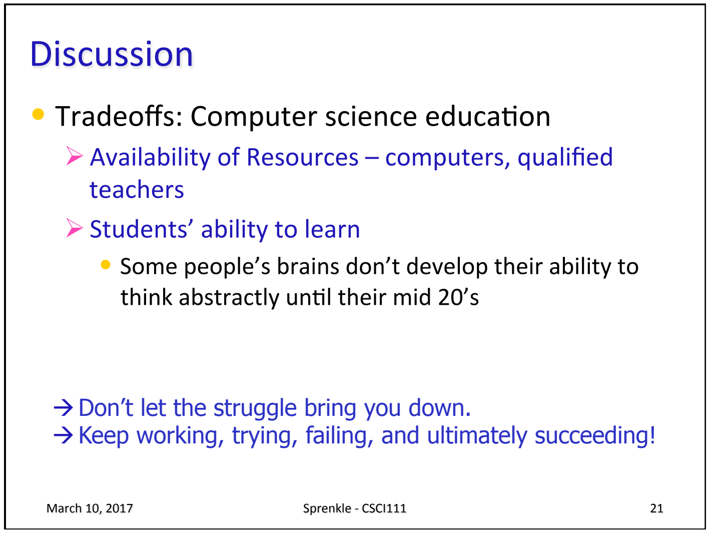
Ashley Burke George Jae Robert	Collin Mike Sarah Tony Victor	Alex Anna Kate Austin Charlotte Win	Buddy John Lexi Zander	Josette Leslie Mira Molly

Computer Science Education

- Who should be interested in computer science education?
- When should computer science be taught?
  - What are the tradeoffs?
  - What forms can it take?
- Is Computer Science an acceptable replacement for foreign language?
  - If not foreign language, where does it fit?
- What are the effects of encouraging more computer science education?

Computer Science Education

- How many of your high schools offered
  - Computing courses?
  - AP Computer Science?
- How many of you would recommend computer science to a friend?



Discussion

- Tradeoffs: Computer science education
  - Availability of Resources – computers, qualified teachers
  - Students' ability to learn
    - Some people's brains don't develop their ability to think abstractly until their mid 20's

→ Don't let the struggle bring you down.
→ Keep working, trying, failing, and ultimately succeeding!