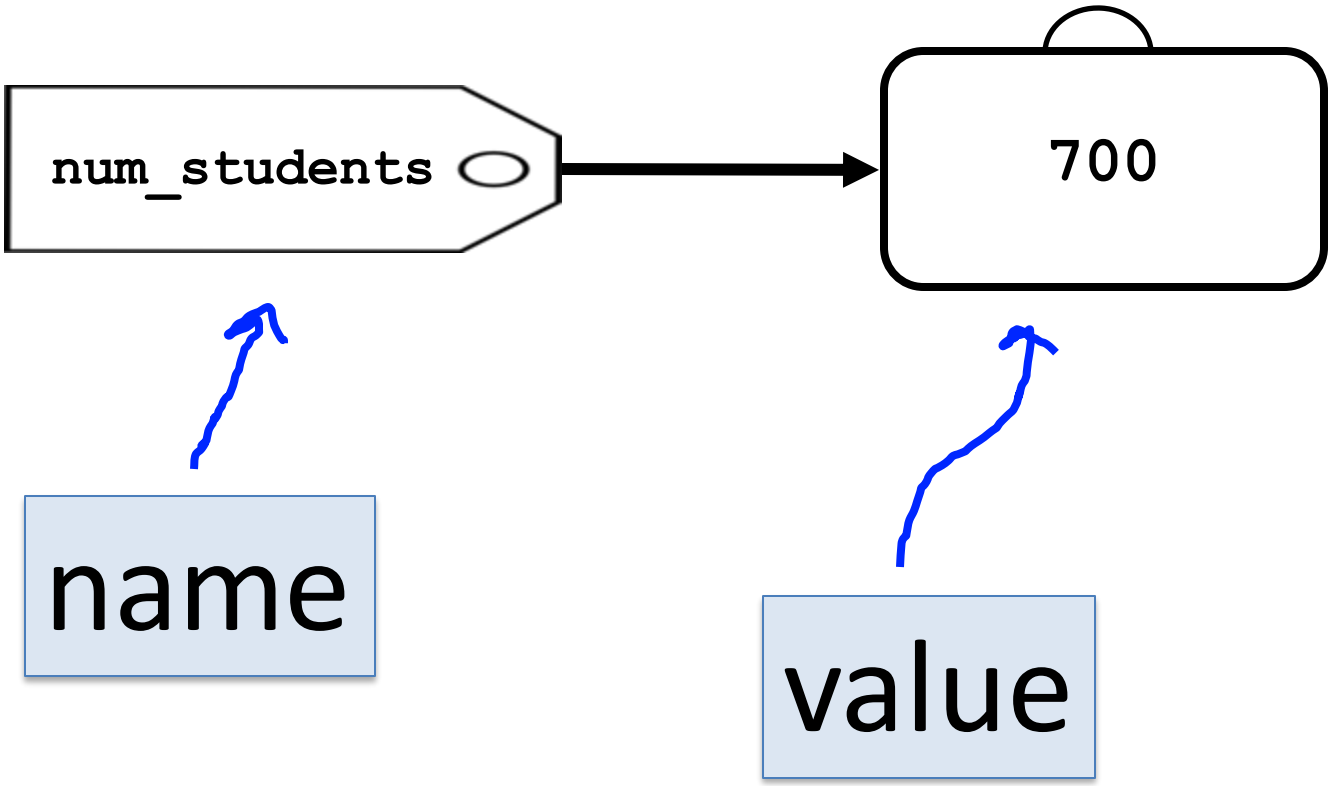
While/If Revisited

Chris Piech and Mehran Sahami
Stanford University

Review

Variables are like Boxes

```
num_students = 700
```



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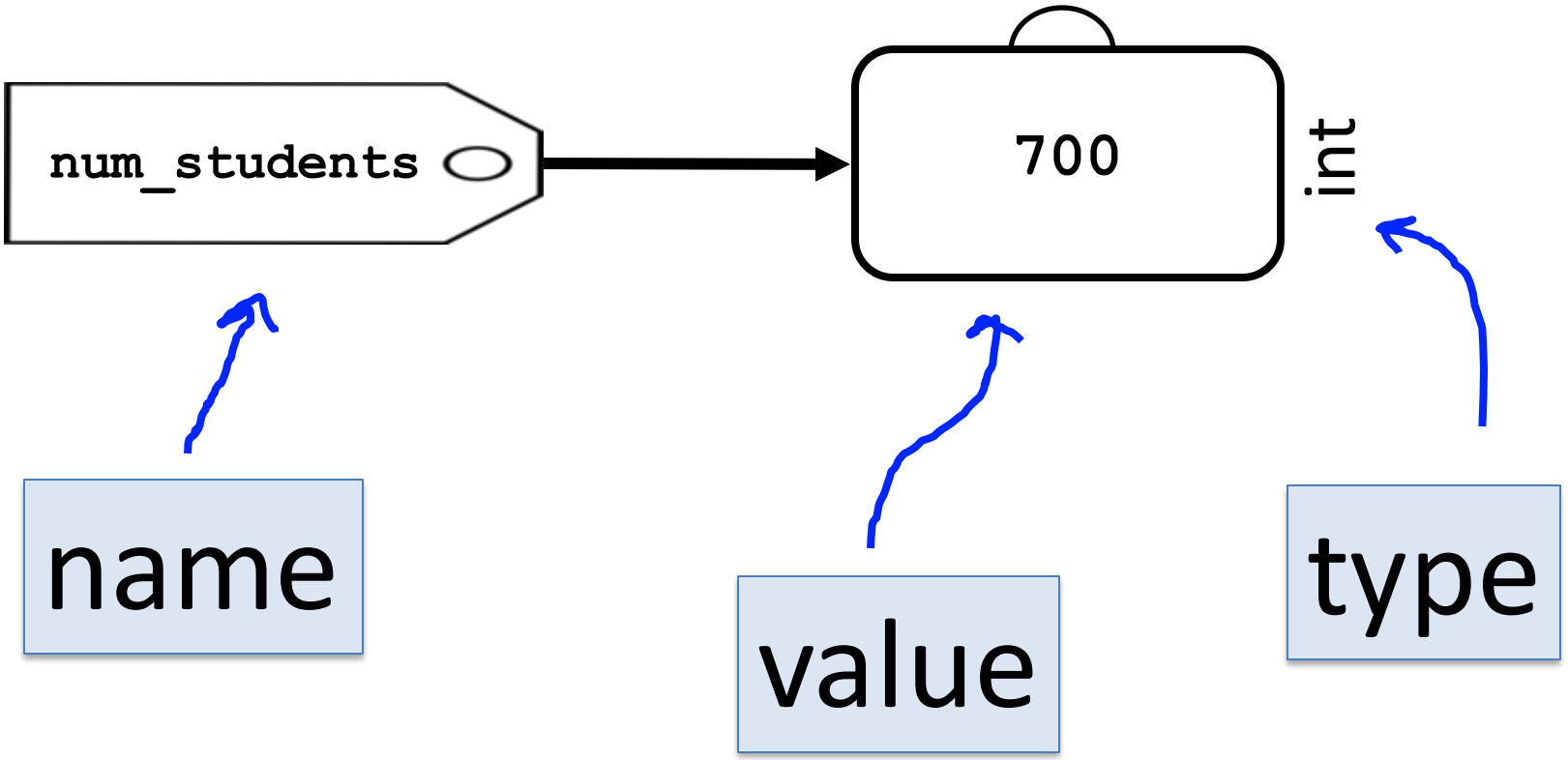
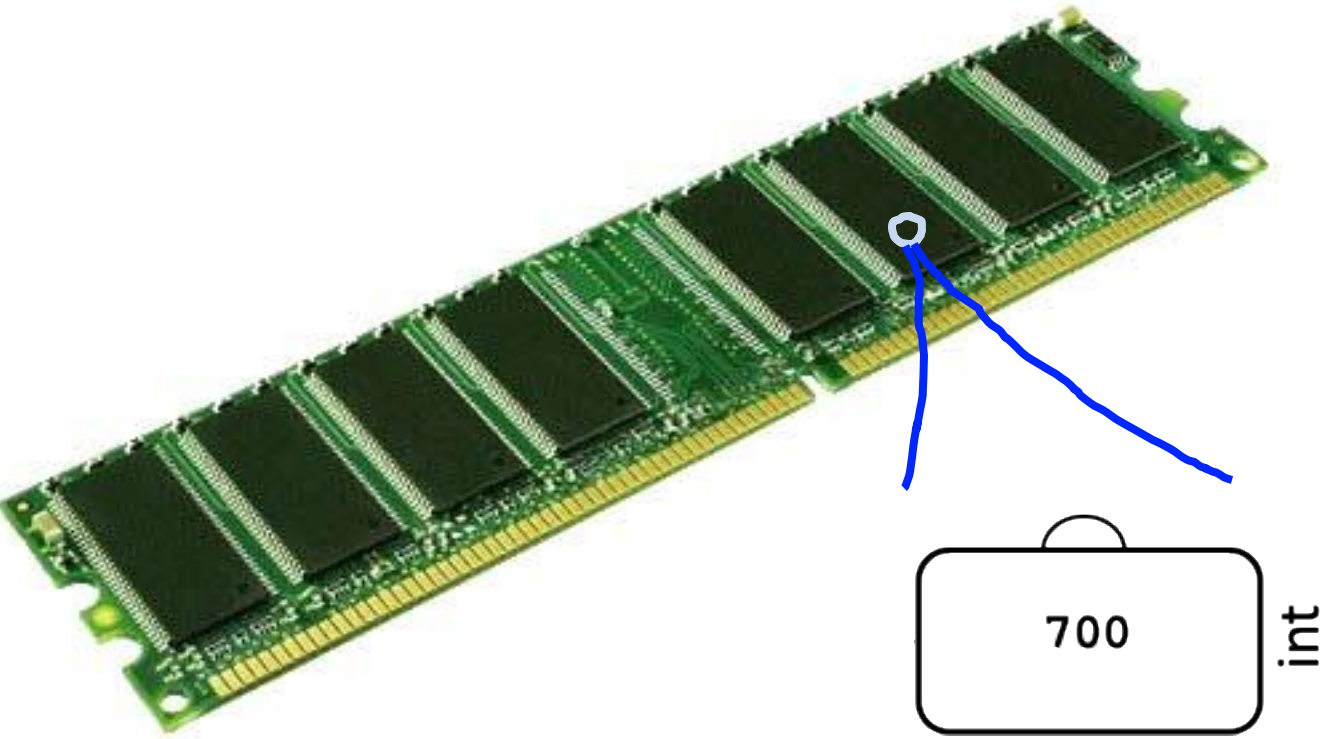


Teeny Tiny Boxes



My computer has space for about 10 billion boxes

Create, Modify, Use

```
# Create a variable, of type int
# called age.
age = 37

# Use the value in age (output it)
print(f"age is: {age}")

# Modify age to be one greater.
age = age + 1
```

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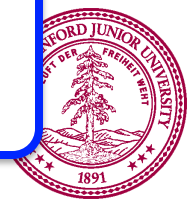
Arithmetic Operators

+	Addition	*	Multiplication
–	Subtraction	/	Division



Review Example: Bolt Calculator

Usain Bolt has the record speed for any human

He was recorded going 10.44 meters per second

Review: Bolt Calculator

```
SPEED = 10.44  # Bolt's speed in meters / second

def main():
    time_str = input("Run time (s): ")
    time = float(time_str)
    distance = SPEED * time
    print(f"Bolt can run {distance} meters.")
```

terminal

```
% python main.py
```

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% python main.py
Run time (s):
```

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```

terminal

```
% python main.py
Run time (s): 60
```

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terminal

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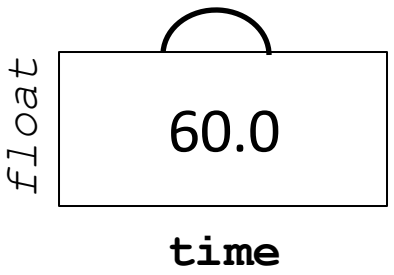

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terminal

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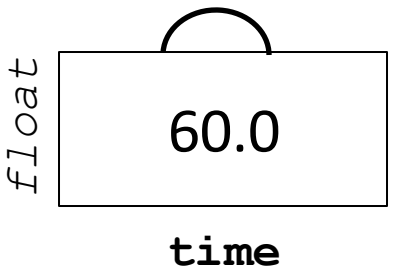

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```

626.4

terminal

```
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Run time (s): 60
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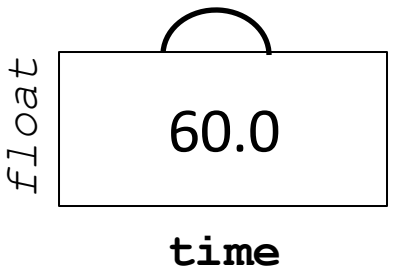

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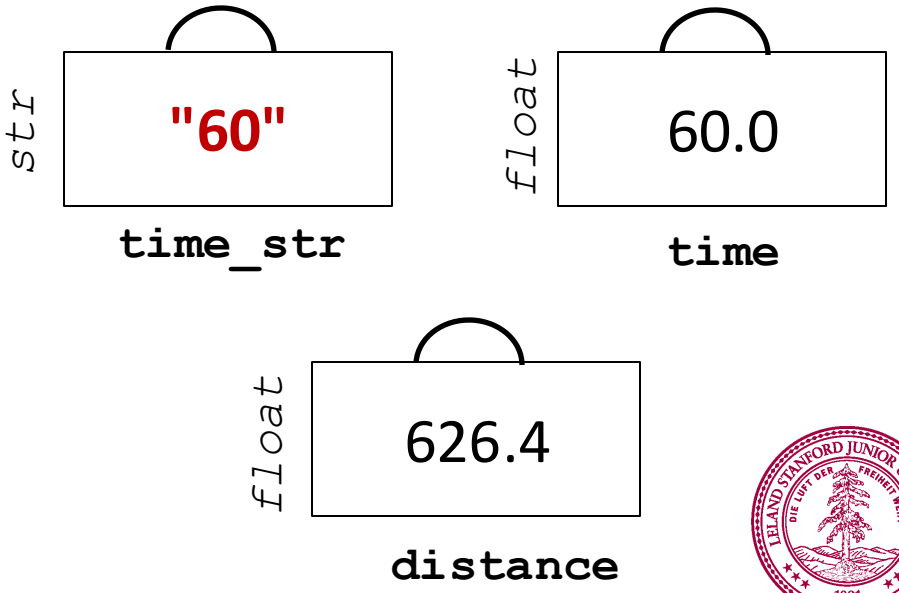

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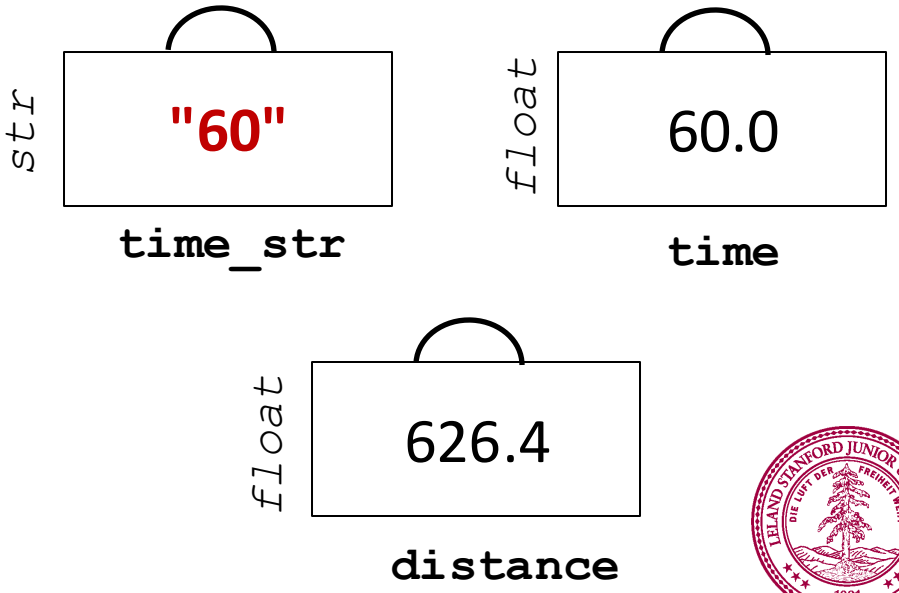

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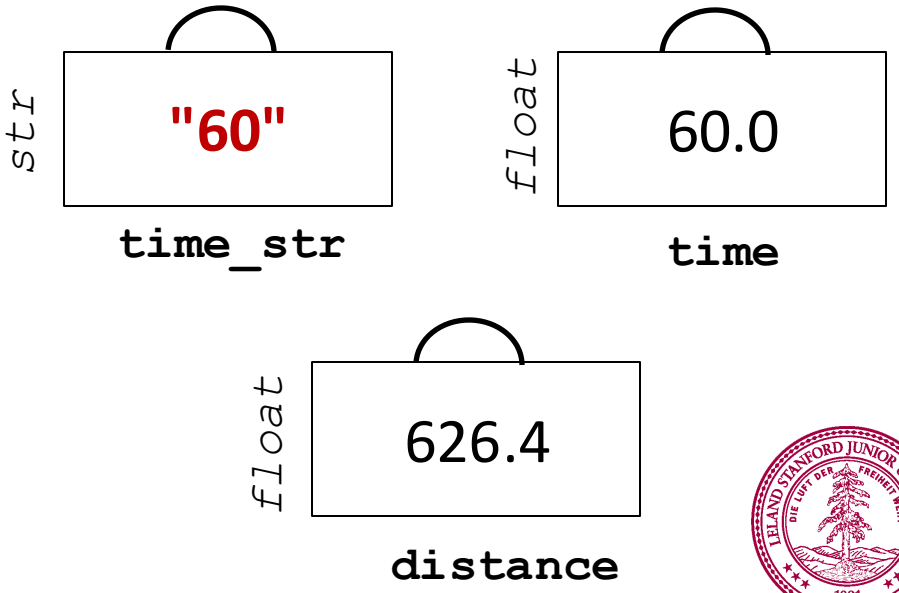
```

terminal

```
% python main.py
Run time (s): 60
Bolt can run 626.4 meters
```

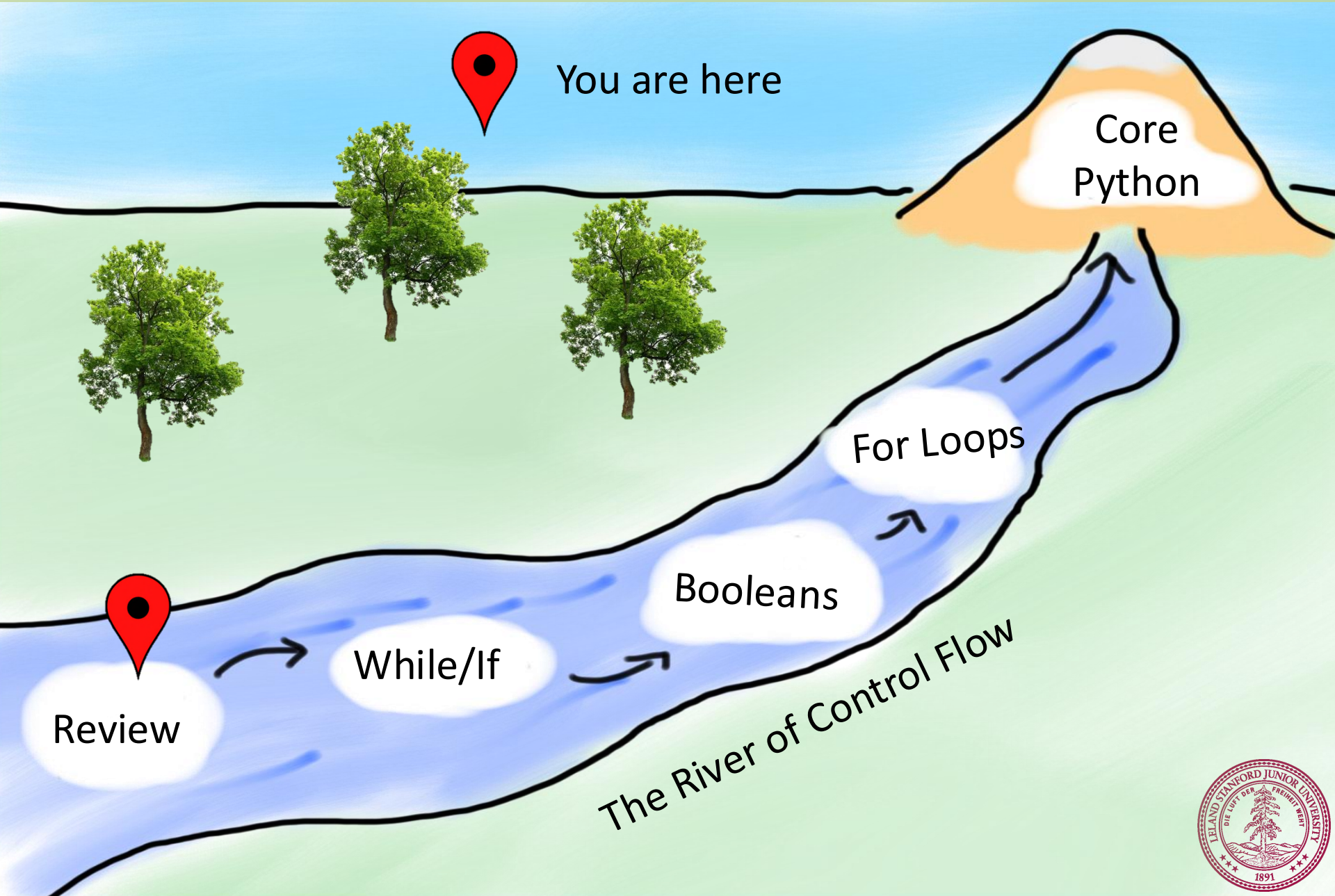


End Review

Today's Goal

1. Be able to use For / While / If in Python

Today's Route



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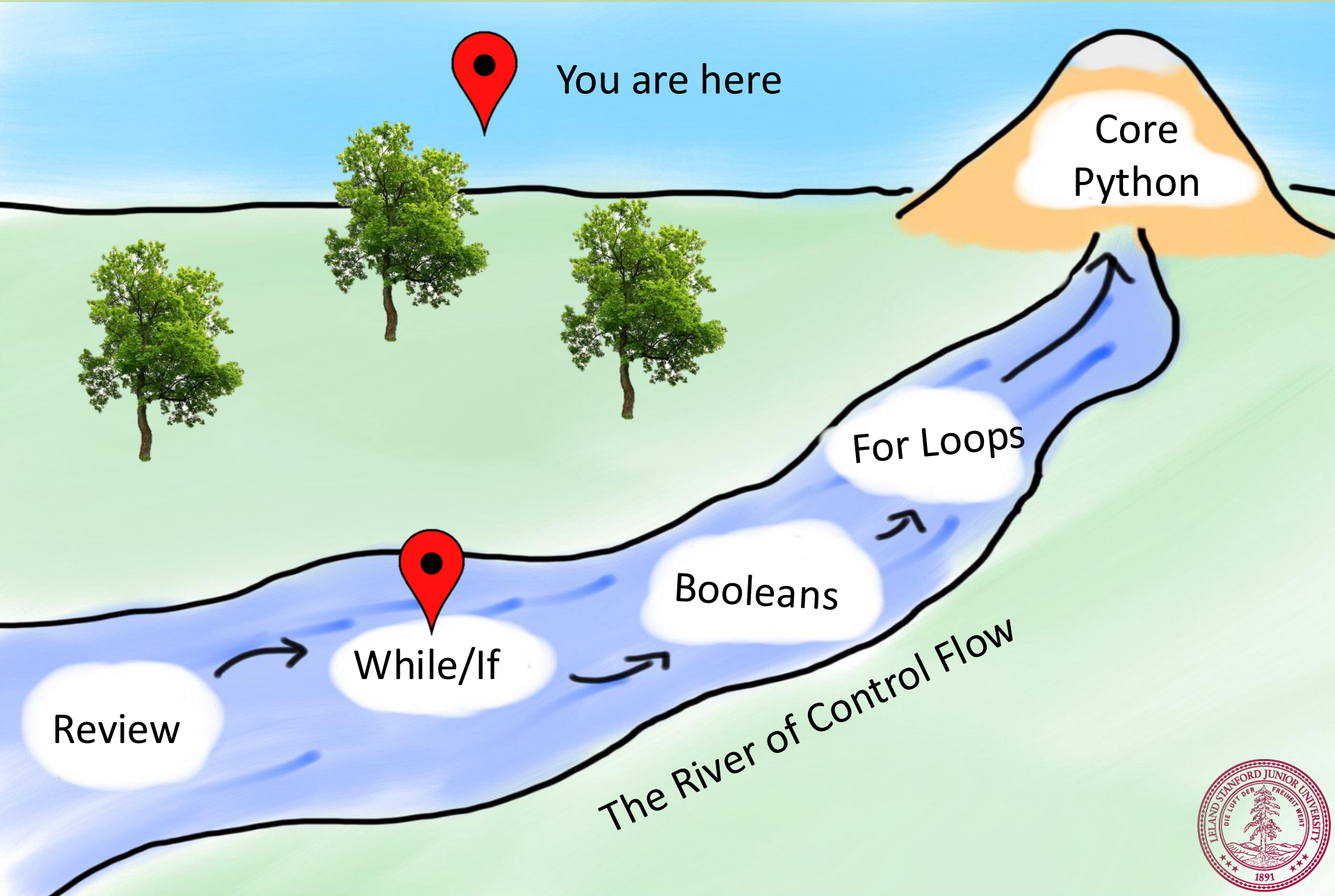

While Loop in Karel

```
while front_is_clear() :
    body
```

```
if beepers_present() :
    body
```

While Loop Redux

```
while condition :
    body
```

```
if condition :
    body
```

The condition should be a **boolean** which is either `True` or `False`

While Loop: Bolt Distance

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While Loop: Bolt Distance

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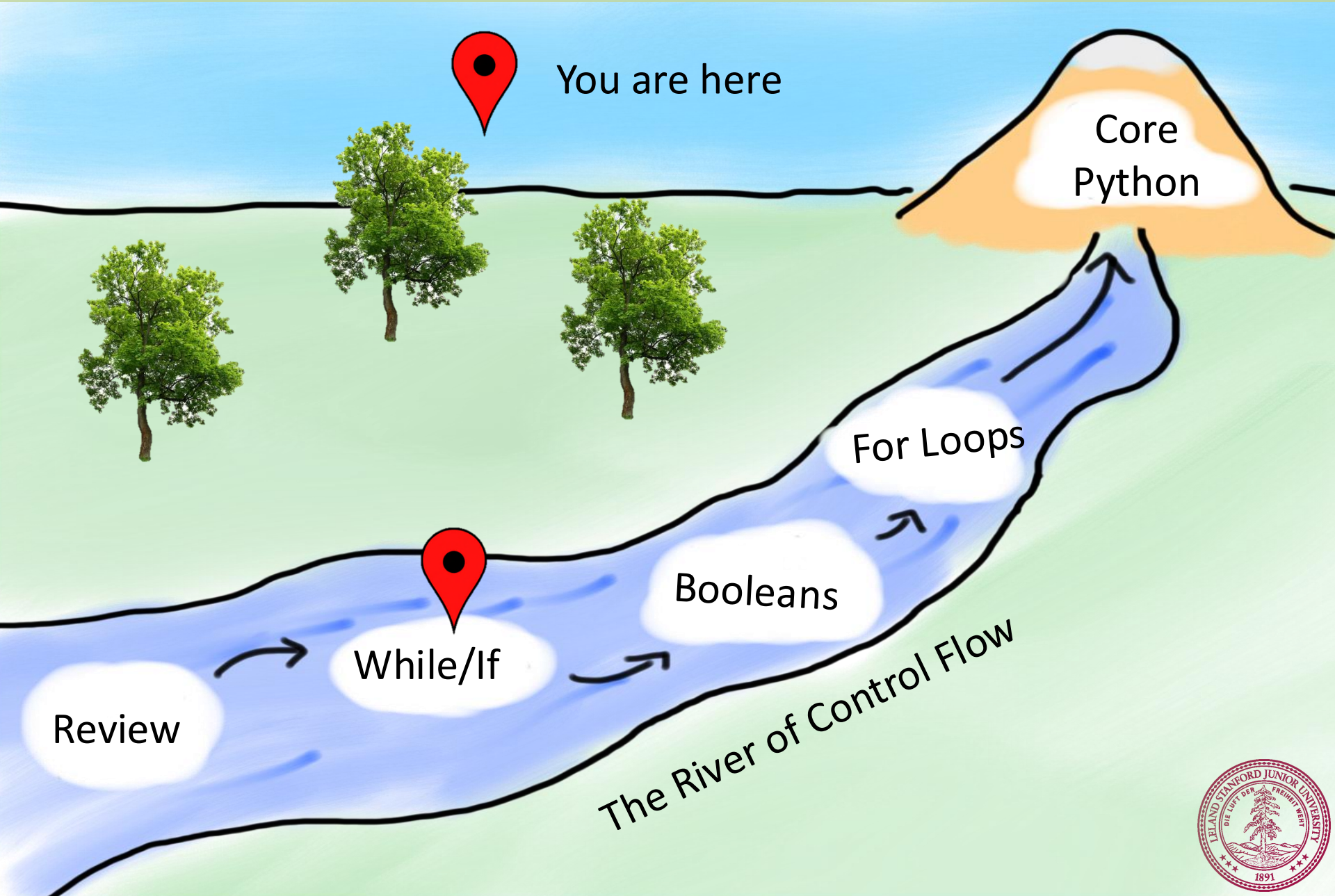

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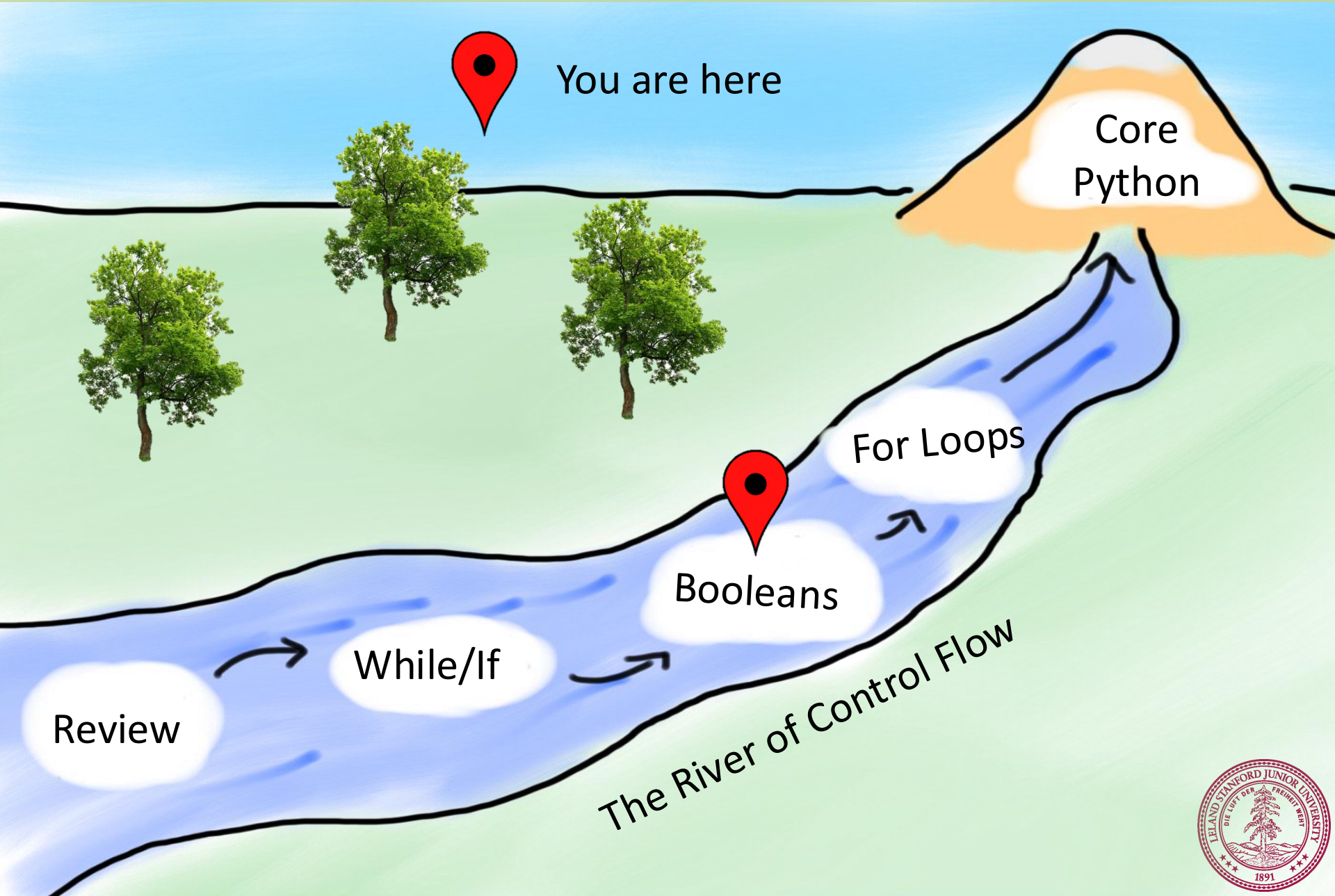

Booleans

front_is_clear()

```
True
```

Booleans

beepers_present()

```
True
```

Booleans

```
s = "123"
s.is_digit()
```

```
True
```

Booleans

my_var < 3

`True`

Comparison Operators

Operator	Meaning	Example	Value
==	equals	`1 + 1 == 2`	`True`
!=	does not equal	`3.2 != 2.5`	`True`
<	less than	`10 < 5`	`False`
>	greater than	`10 > 5`	`True`
<=	less than or equal to	`126 <= 100`	`False`
>=	greater than or equal to	`5.0 >= 5.0`	`True`

* All have equal precedence

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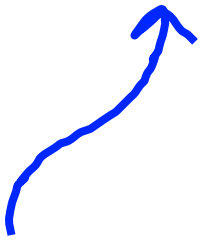
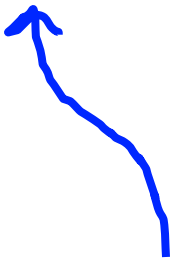
Spot the difference #1

```
x = 7
```



Sets the value of a variable named x to be 7. Creates the variable if it didn't exist.

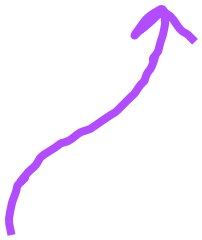
```
x == 7
```



Checks if a variable named x has the value 7

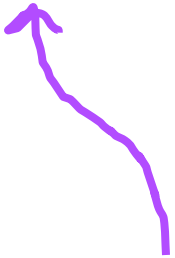
Spot the difference #2

```
x == 5
```



Checks if x is the number 5

```
x == "5"
```



Checks if x is the string 5

Comparison Operators

```
if 1 < 2 :
   print("1 is less than 2")
```

```
num = int(input("Enter a number: "))
if num == 0:
   print("That number is 0")
else :
   print("That number is not 0.")
```

If Else Revisited

```
num = int(input("Enter a number: "))
if num == 0:
   print("Your number is 0 ")
else:
   if num > 0:
      print("Your number is positive")
   else:
      print("Your number is negative")
```

If Else Revisited

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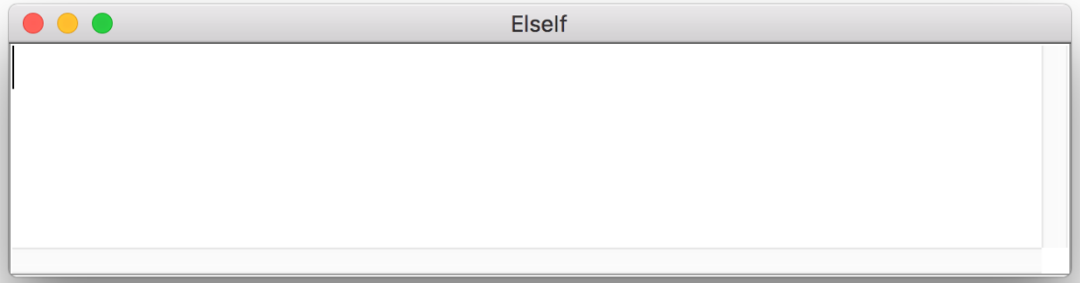

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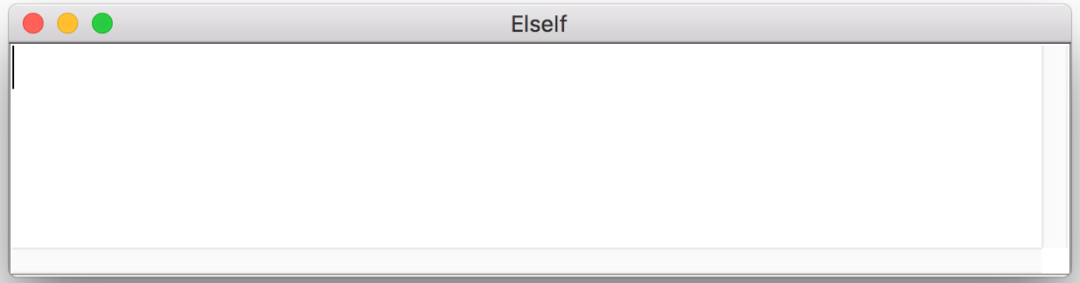

If Else Revisited

"5"

```
num = int(input("Enter a number: "))
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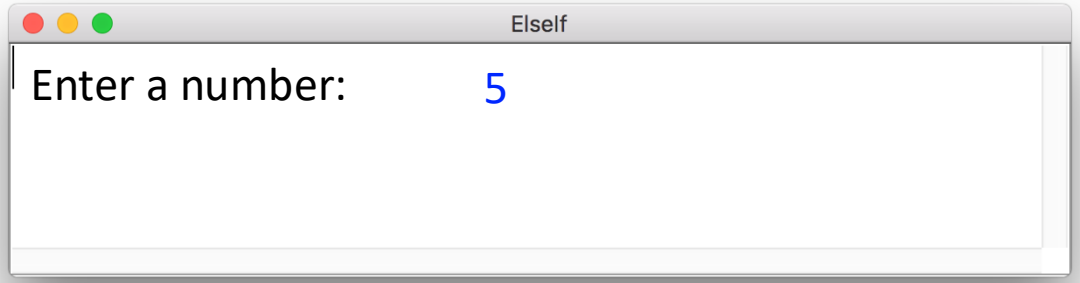

If Else Revisited

5

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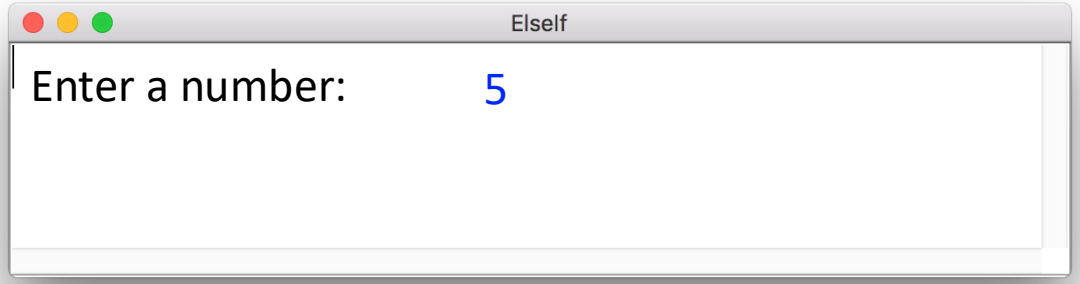

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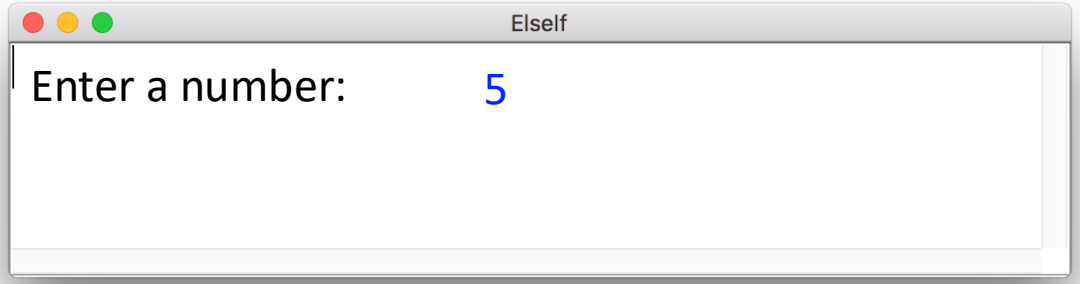

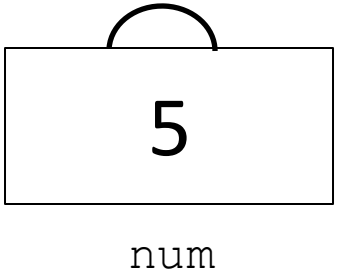

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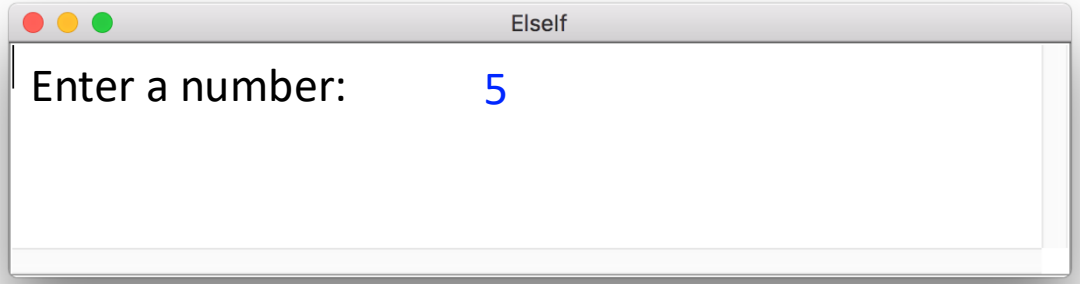

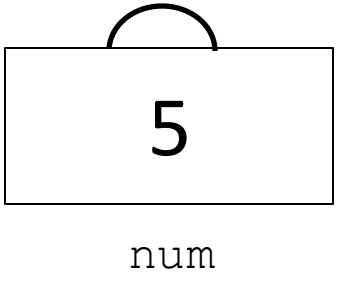

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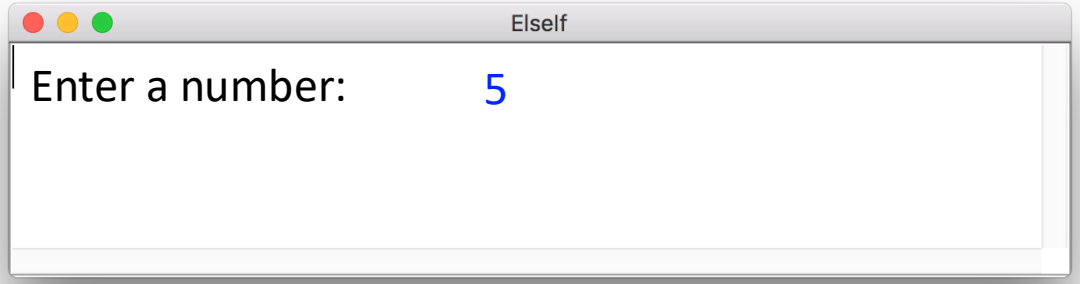

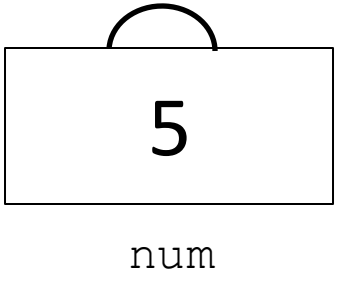

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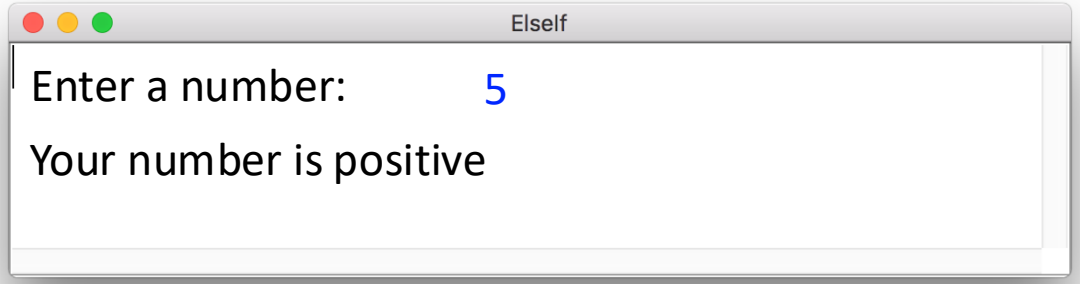
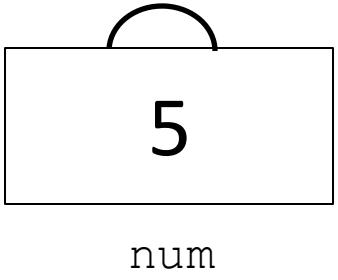
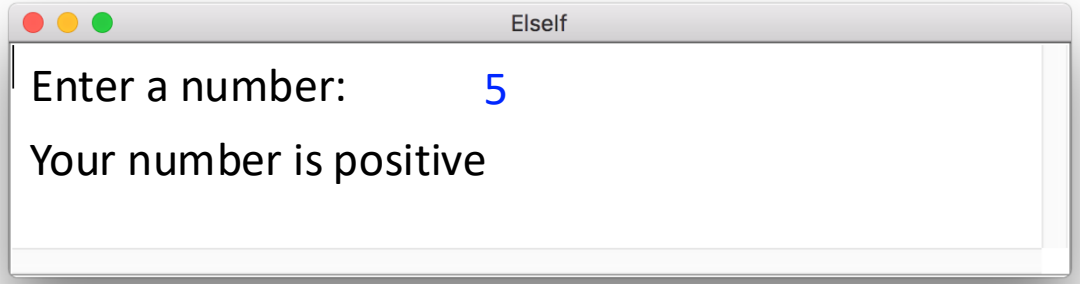
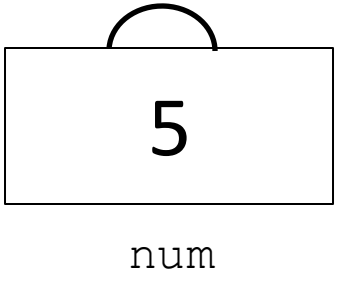




If Else Revisited

```
num = int(input("Enter a number: "))
if num == 0:
    print("Your number is 0 ")
elif num > 0:
    print("Your number is positive")
else:
    print("Your number is negative")
```





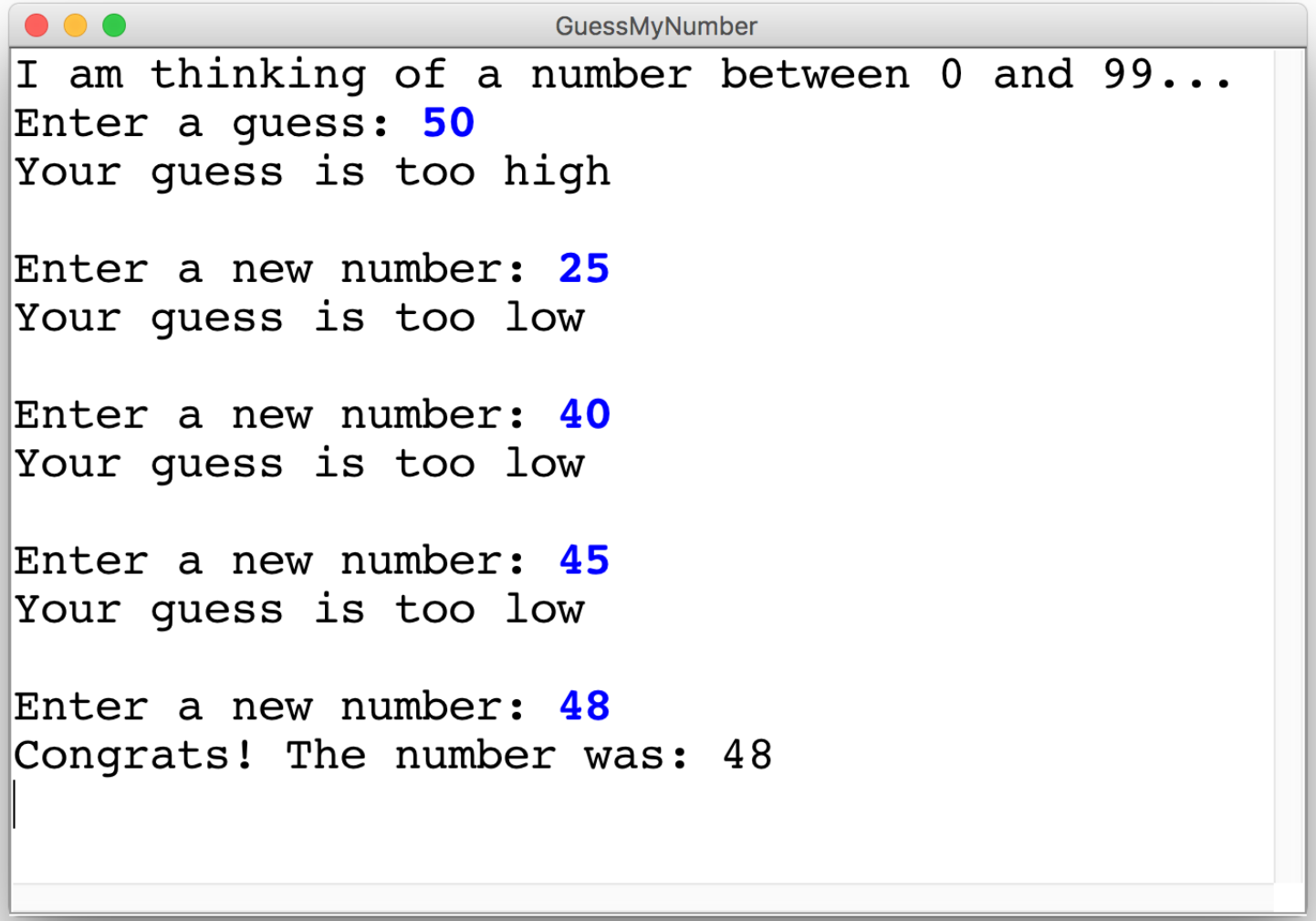
Conditions in Python

Use **while** and **if** statements in Python.

They are the same as in Karel, except that the *test* can be any expression that evaluates to **True** or **False**

Amazing

Guess My Number



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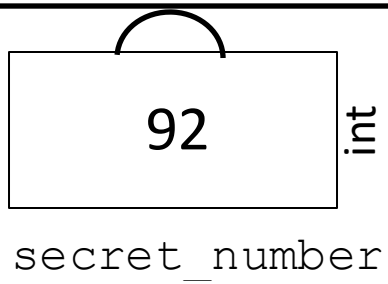
    print("") # an empty line
    guess = int(input("Enter a new guess: "))

print(f"Congrats! The number was: {secret_number}")
```



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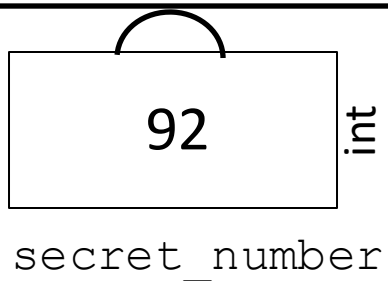

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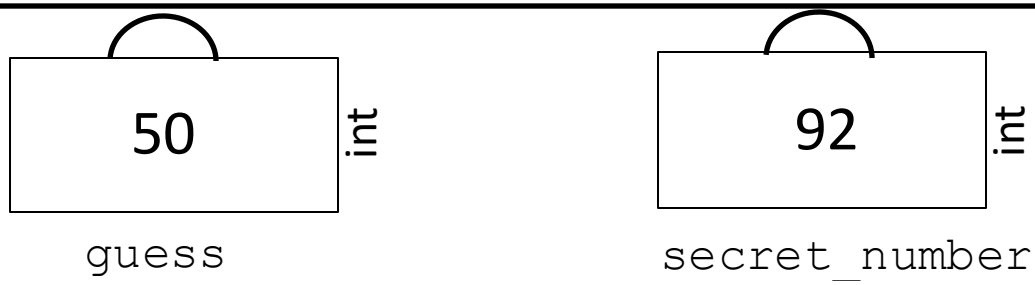

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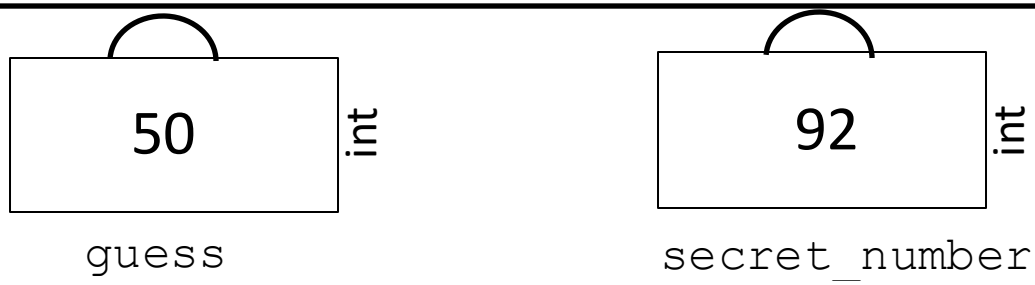

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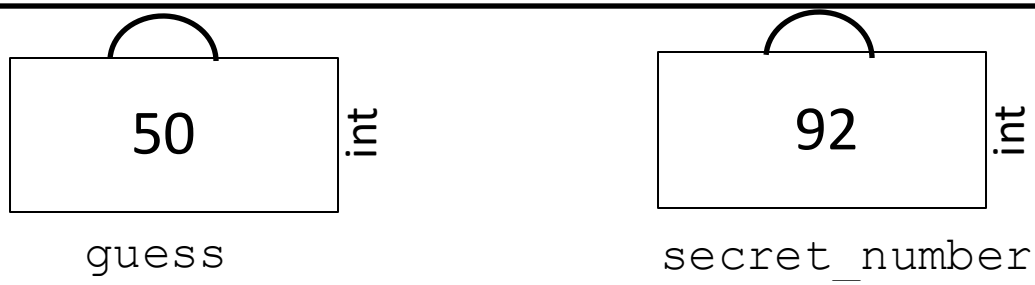

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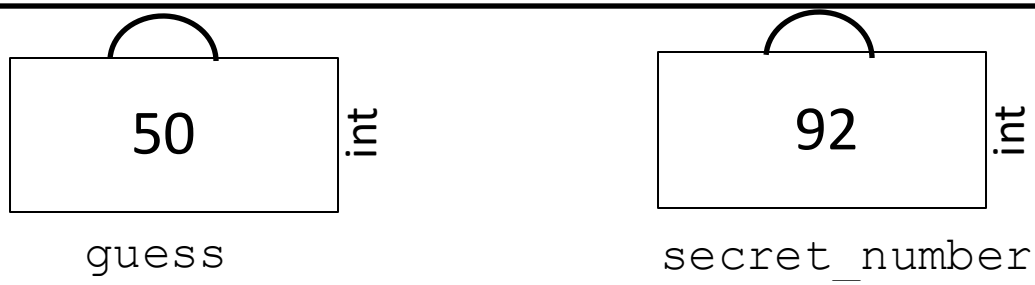

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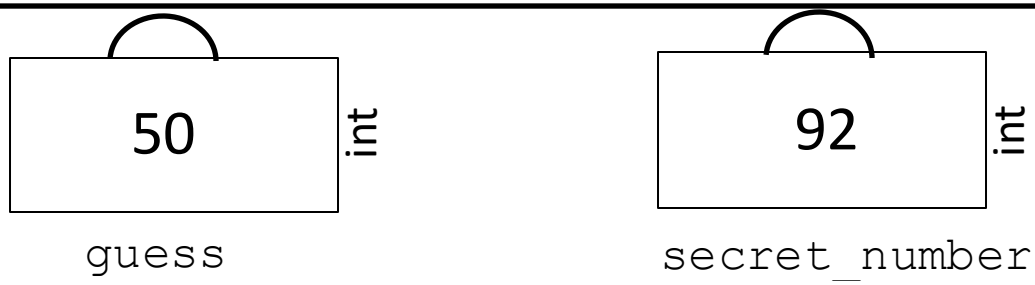

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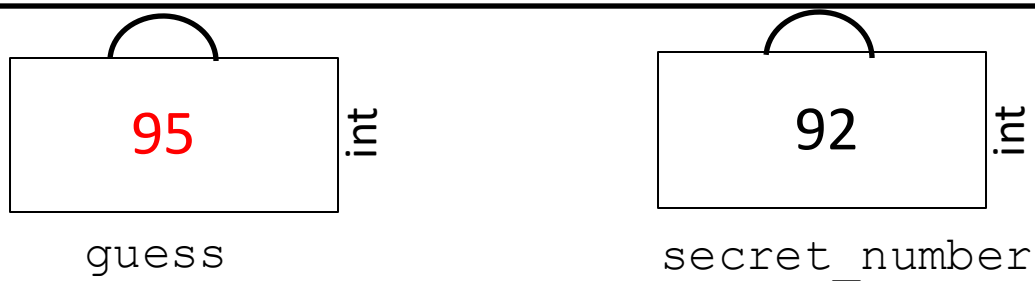

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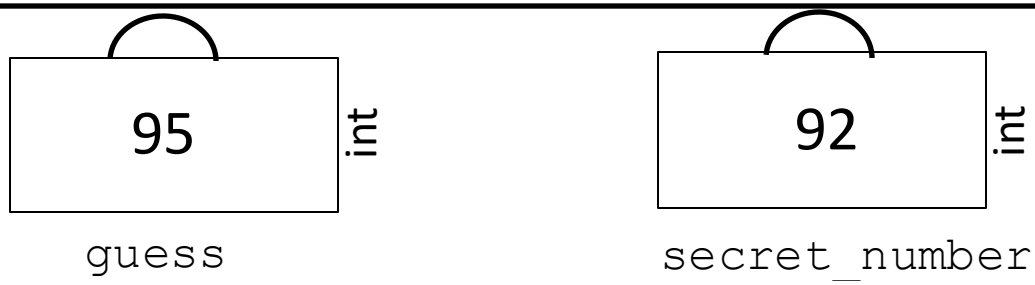

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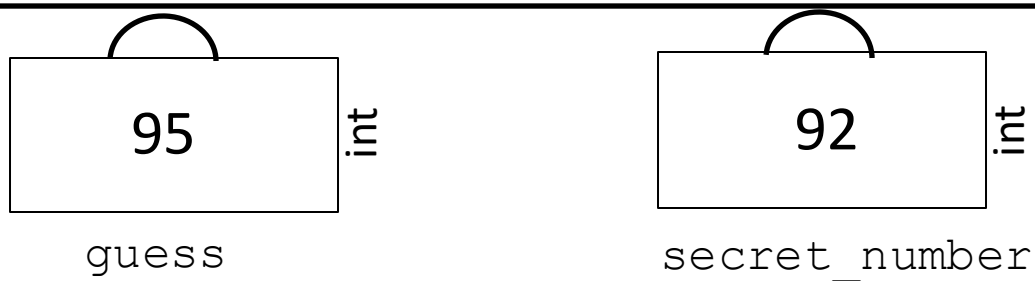

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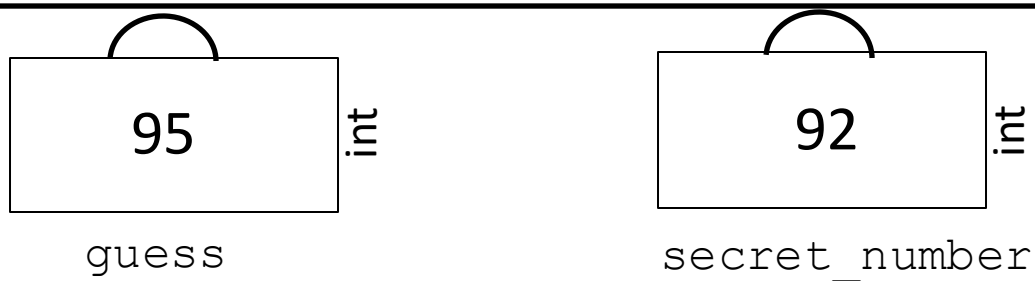

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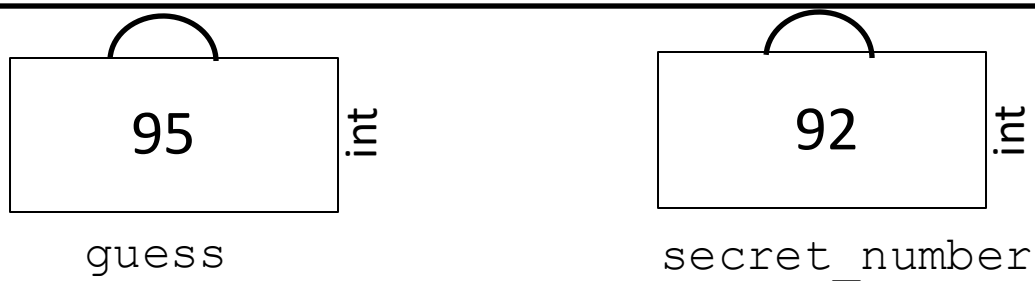

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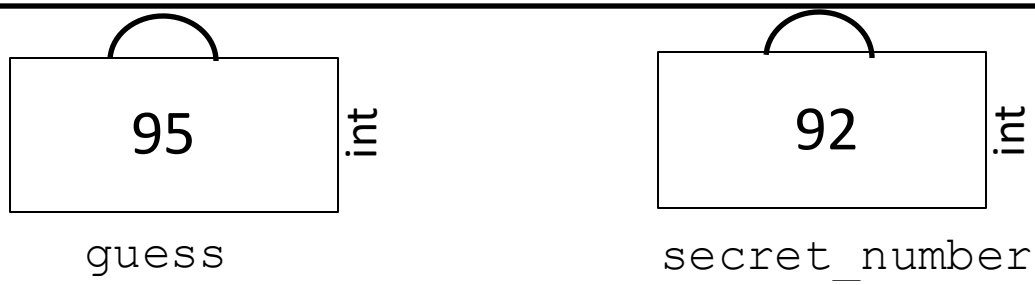

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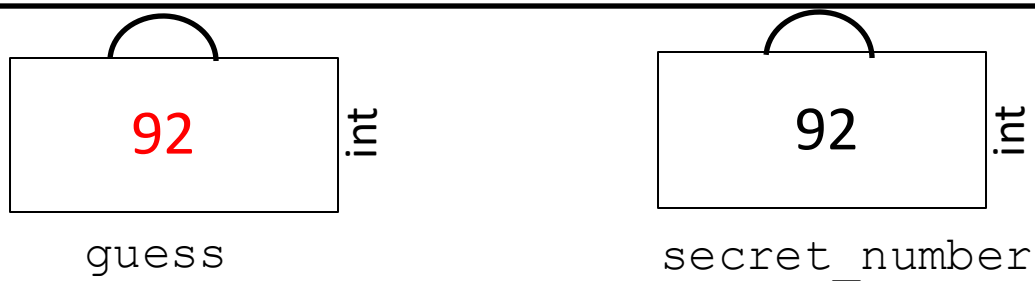

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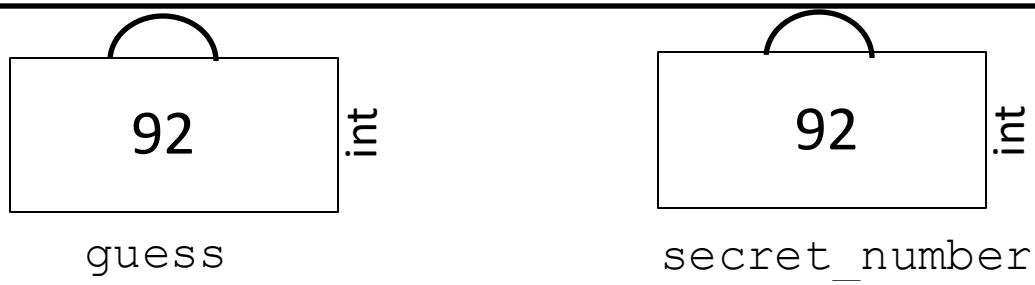

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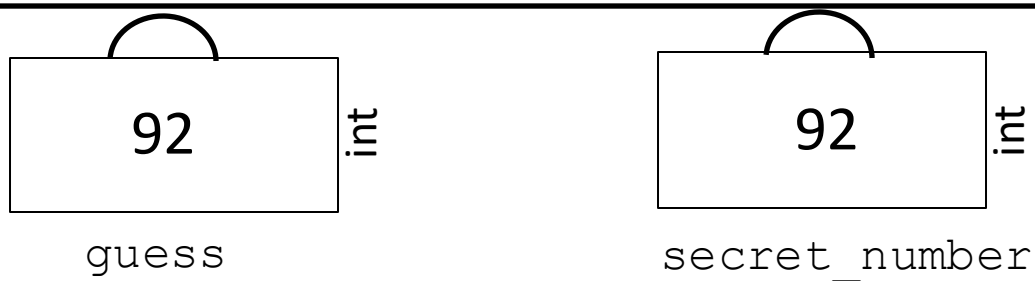

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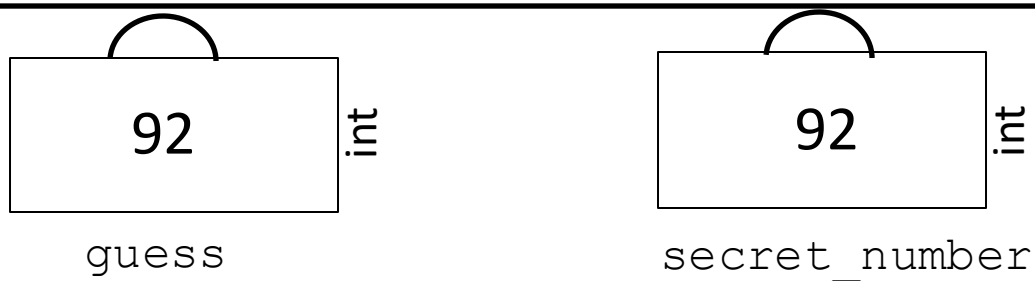


Behind the Scenes

Guess My Number

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```
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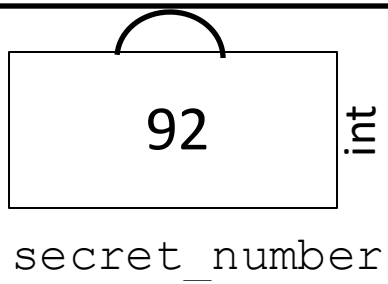

Guess My Number

```
secret_number = random.randint(1, 99)
print("I am thinking of a number between 1 and 99...")


while ???:
    # Repeat some stuff???




print(f"Congrats! The number was: {secret_number}")
```

Guess My Number

```
secret_number = random.randint(1, 99)
print("I am thinking of a number between 1 and 99...")


while ???:
    # Get a new guess


    # Report high/low




print(f"Congrats! The number was: {secret_number}")
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print(f"Congrats! The number was: {secret_number}")
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Guess My Number

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secret_number = random.randint(1, 99)
print("I am thinking of a number between 1 and 99...")


while guess != secret_number:
    # Get a new guess
    guess = int(input("Enter a guess: "))


    # Report high/low


print(f"Congrats! The number was: {secret_number}")
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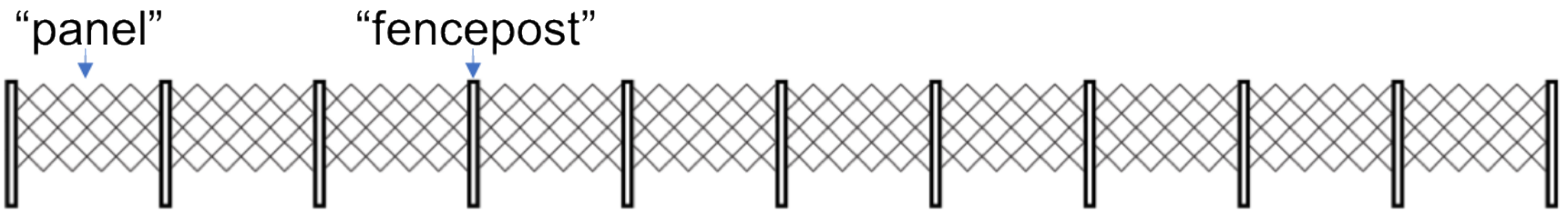

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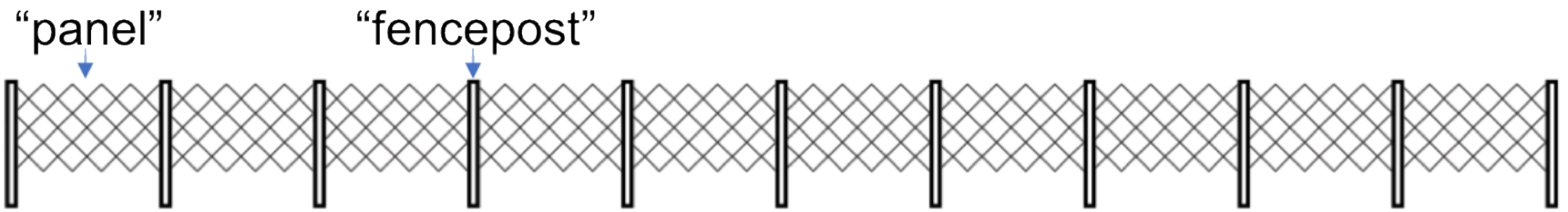

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```

George Boole

English Mathematician teaching in Ireland 1815 – 1864
Boole died of being too cool

Logical Operators

In order of precedence:

Operator	Example	Result
`not`	`not (2 == 3)`	`True`
`and`	`(2 == 3) and (-1 < 5)`	`False`
`or`	`(2 == 3) or (-1 < 5)`	`True`

Can "chain" tests

```
# is x between 2 and 10?
2 <= x and x <= 10
```

Boolean Variables

```
# Store expressions that evaluate to True/False
x = 1 < 2    # True
y = 5.0 == 4.0  # False

# Directly set to True/False
is_sheltering = True
is_raining = False

play_again = input('Play again? "y" or "n"') == 'y'
if play_again:
    ...
```

Today's Route