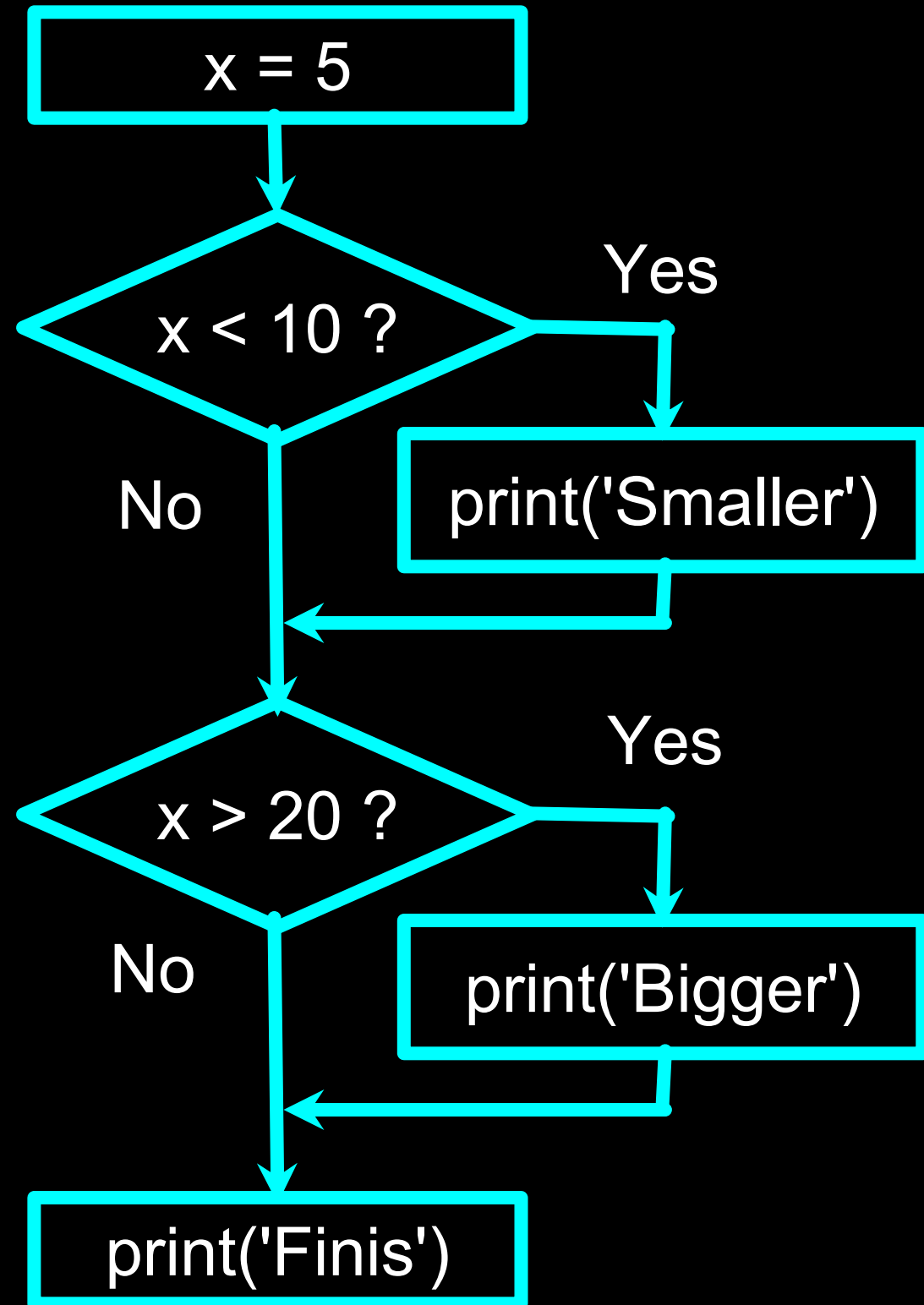


Conditional Execution

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Conditional Steps



Program:

```
x = 5
if x < 10:
    print('Smaller')
if x > 20:
    print('Bigger')

print('Finis')
```

Output:

Smaller
Finis

Comparison Operators

- **Boolean expressions** ask a question and produce a Yes or No result which we use to control program flow
- **Boolean expressions** using **comparison operators** evaluate to True / False or Yes / No
- Comparison operators look at variables but do not change the variables

Python	Meaning
<	Less than
<=	Less than or Equal to
==	Equal to
>=	Greater than or Equal to
>	Greater than
!=	Not equal

Remember: “=” is used for assignment.

http://en.wikipedia.org/wiki/George_Boole

Comparison Operators

<code>x = 5</code>	
<code>if x == 5 :</code> <code>print('Equals 5')</code>	Equals 5
<code>if x > 4 :</code> <code>print('Greater than 4')</code>	Greater than 4
<code>if x >= 5 :</code> <code>print('Greater than or Equals 5')</code>	Greater than or Equals 5
<code>if x < 6 : print('Less than 6')</code>	Less than 6
<code>if x <= 5 :</code> <code>print('Less than or Equals 5')</code>	Less than or Equals 5
<code>if x != 6 :</code> <code>print('Not equal 6')</code>	Not equal 6

One-Way Decisions

```
x = 5
```

```
print('Before 5')
```

```
if x == 5 :
```

```
    print('Is 5')
```

```
    print('Is Still 5')
```

```
    print('Third 5')
```

```
print('Afterwards 5')
```

```
print('Before 6')
```

```
if x == 6 :
```

```
    print('Is 6')
```

```
    print('Is Still 6')
```

```
    print('Third 6')
```

```
print('Afterwards 6')
```

Before 5

Is 5

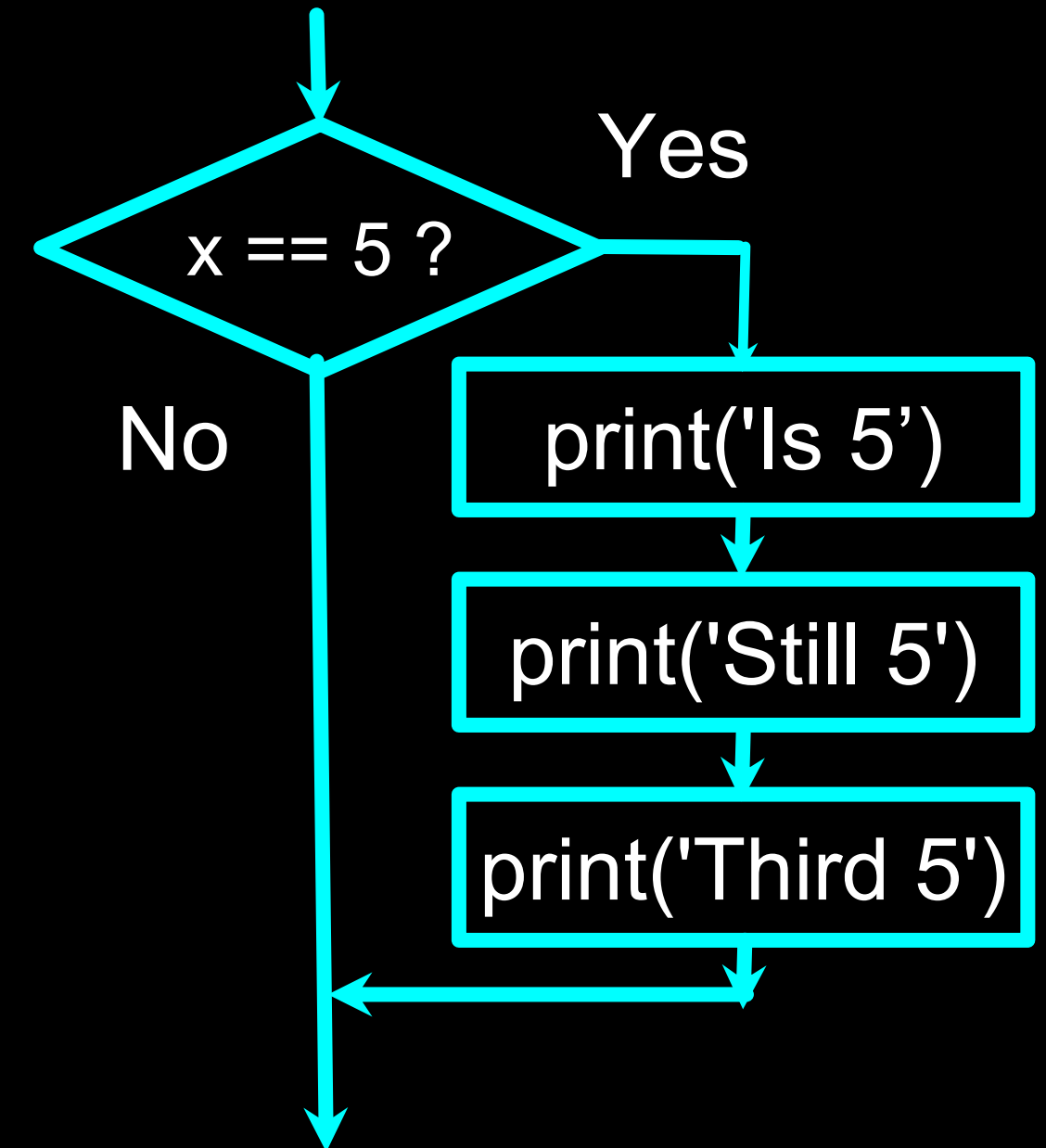
Is Still 5

Third 5

Afterwards 5

Before 6

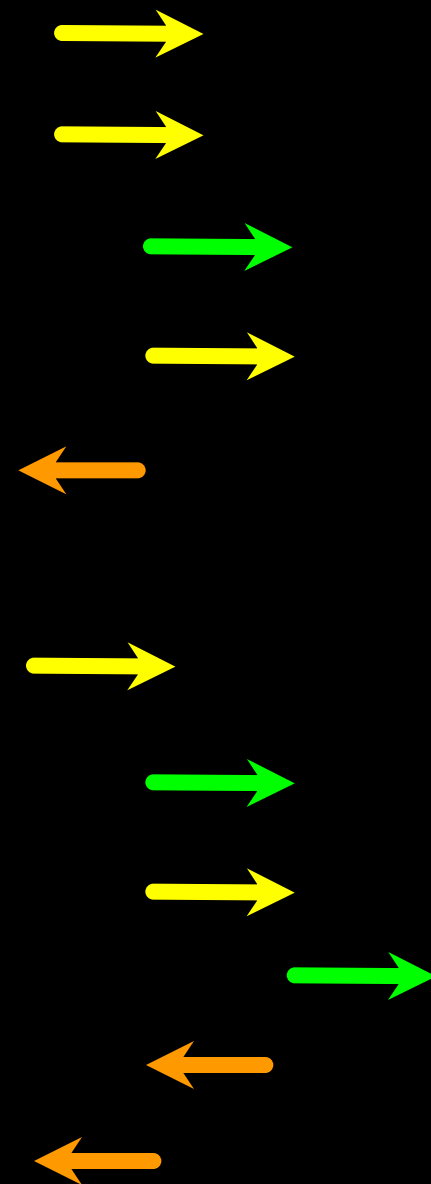
Afterwards 6



Indentation

- **Increase indent** indent after an **if** statement or **for** statement (after :)
- **Maintain indent** to indicate the **scope** of the block (which lines are affected by the **if/for**)
- **Reduce indent** back to the level of the **if** statement or **for** statement to indicate the end of the block
- **Blank lines** are ignored - they do not affect **indentation**
- **Comments** on a line by themselves are ignored with regard to **indentation**

increase / maintain after if or for
decrease to indicate end of block



```
x = 5
if x > 2 :
    print('Bigger than 2')
    print('Still bigger')
print('Done with 2')

for i in range(5) :
    print(i)
    if i > 2 :
        print('Bigger than 2')
    print('Done with i', i)
print('All Done')
```

Think About begin/end Blocks

```
x = 5
```

```
if x > 2 :  
    print('Bigger than 2')  
    print('Still bigger')
```

```
print('Done with 2')
```

```
for i in range(5) :  
    print(i)
```

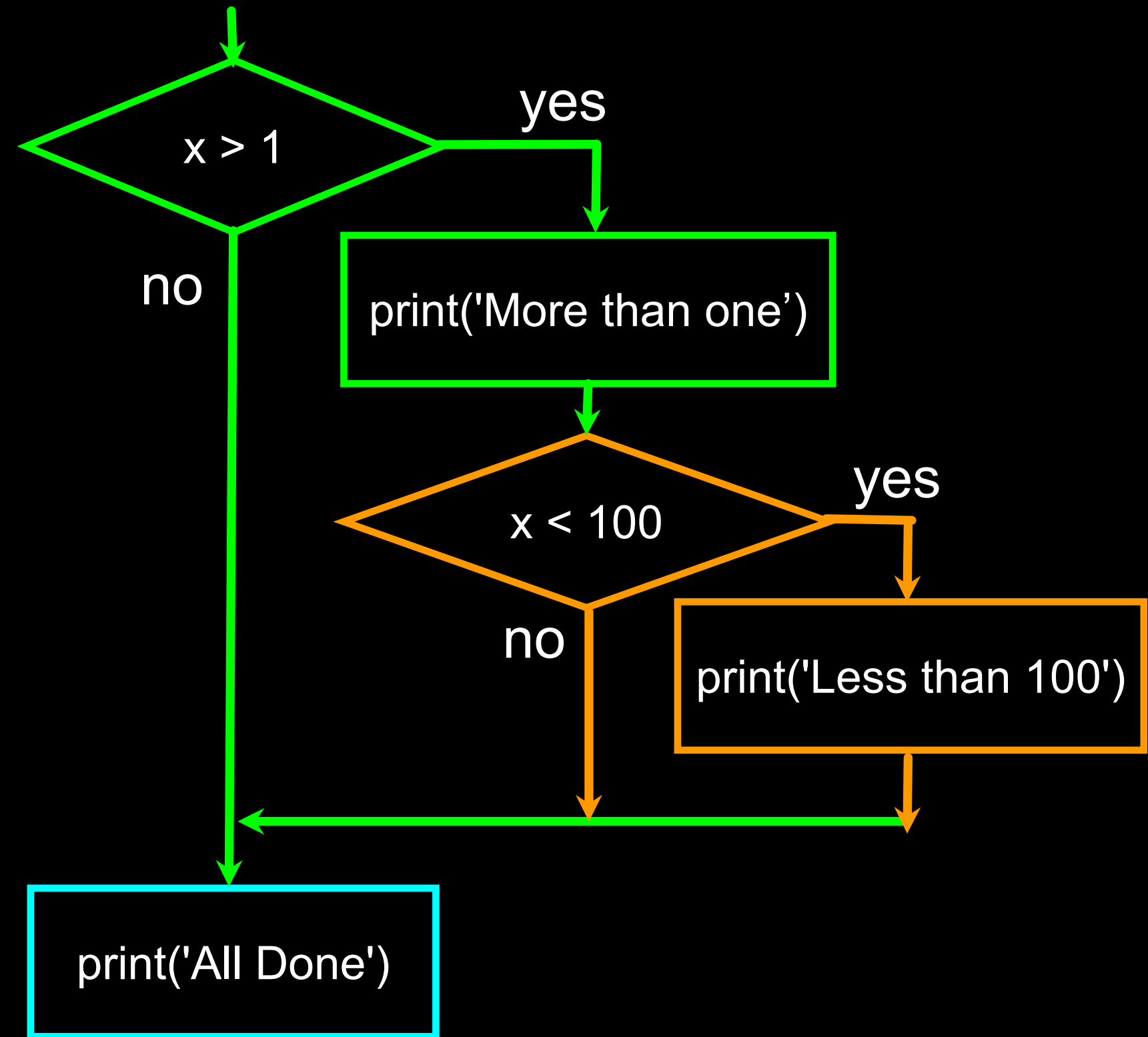
```
    if i > 2 :  
        print('Bigger than 2')
```

```
    print('Done with i', i)
```

```
print('All Done')
```

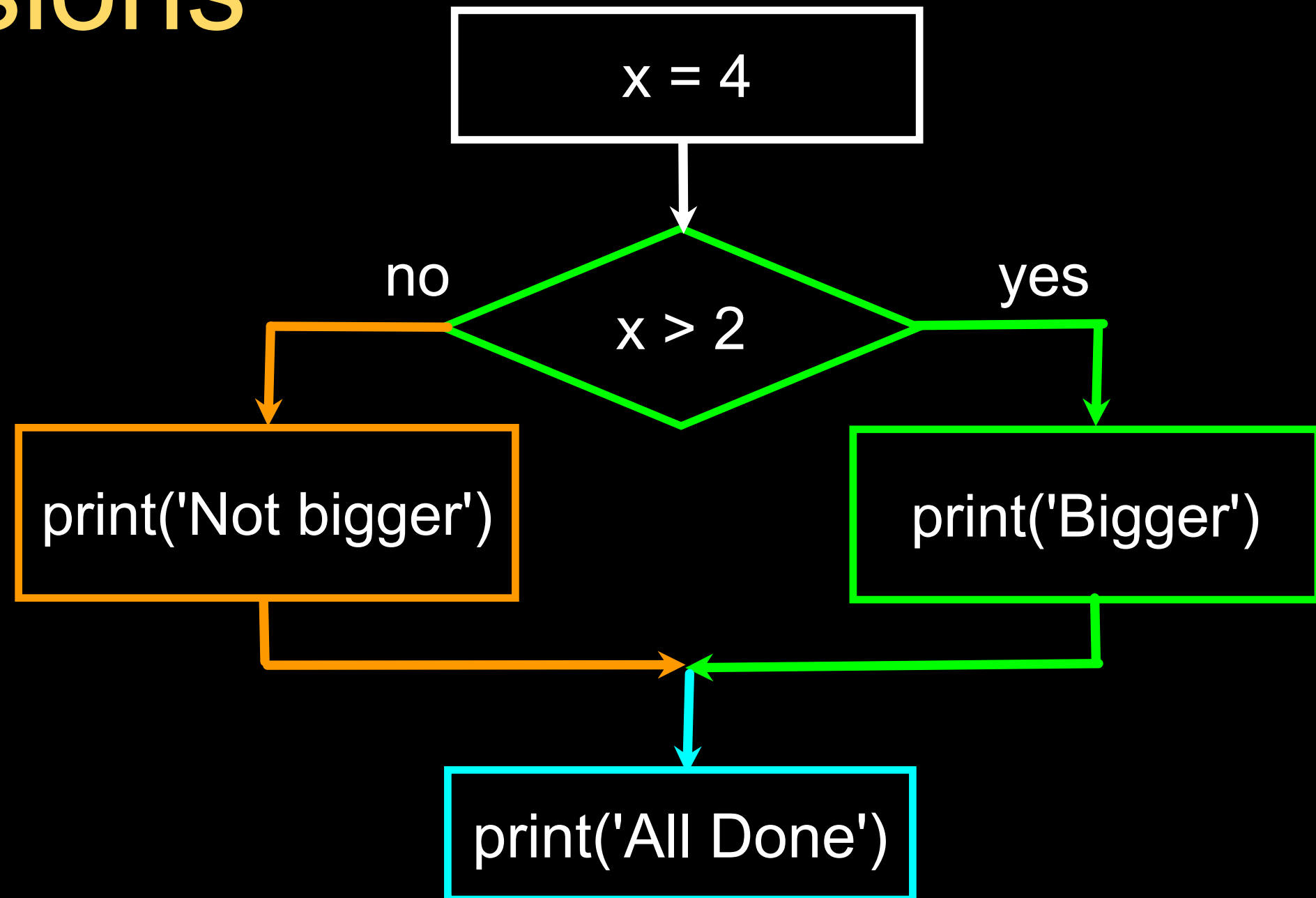

Nested Decisions

```
x = 42
if x > 1 :
    print('More than one')
    if x < 100 :
        print('Less than 100')
print('All done')
```



Two-way Decisions

- Sometimes we want to do one thing if a logical expression is true and something else if the expression is false
- It is like a fork in the road - we must choose **one or the other** path but not both

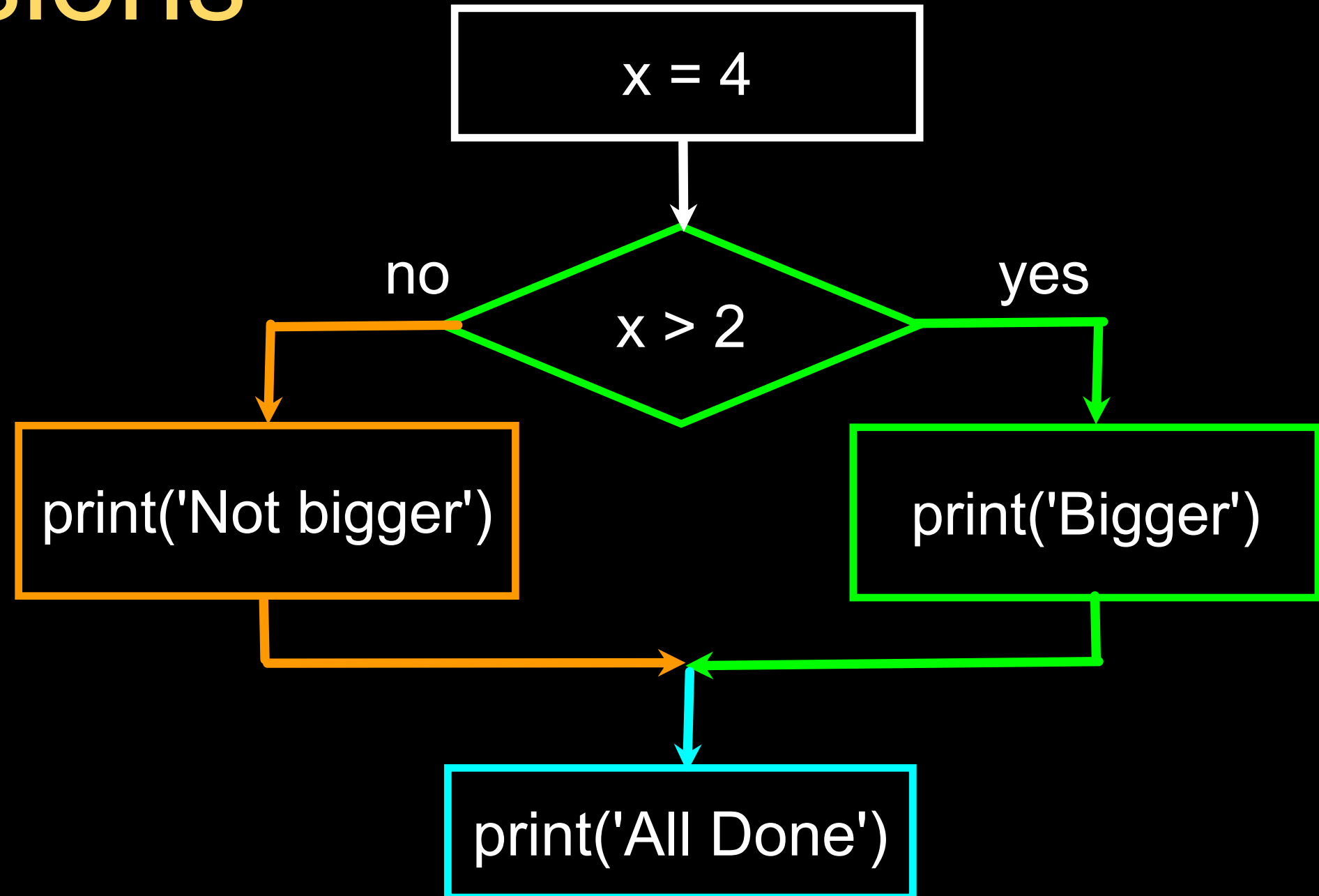


Two-way Decisions with else:

```
x = 4
```

```
if x > 2 :  
    print('Bigger')  
else :  
    print('Smaller')
```

```
print('All done')
```

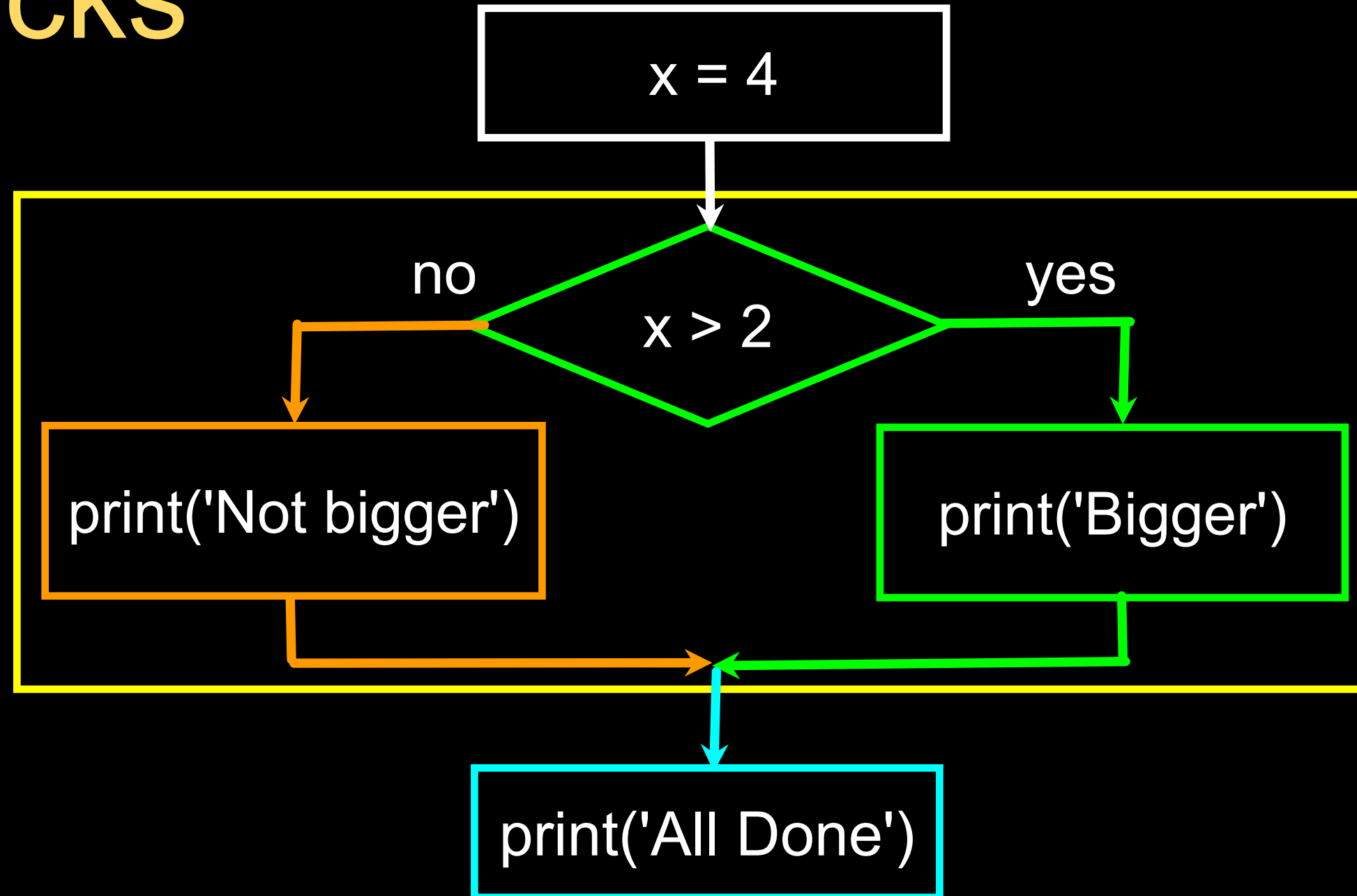


Visualize Blocks

x = 4

```
if x > 2 :  
    print('Bigger')  
else :  
    print('Smaller')
```

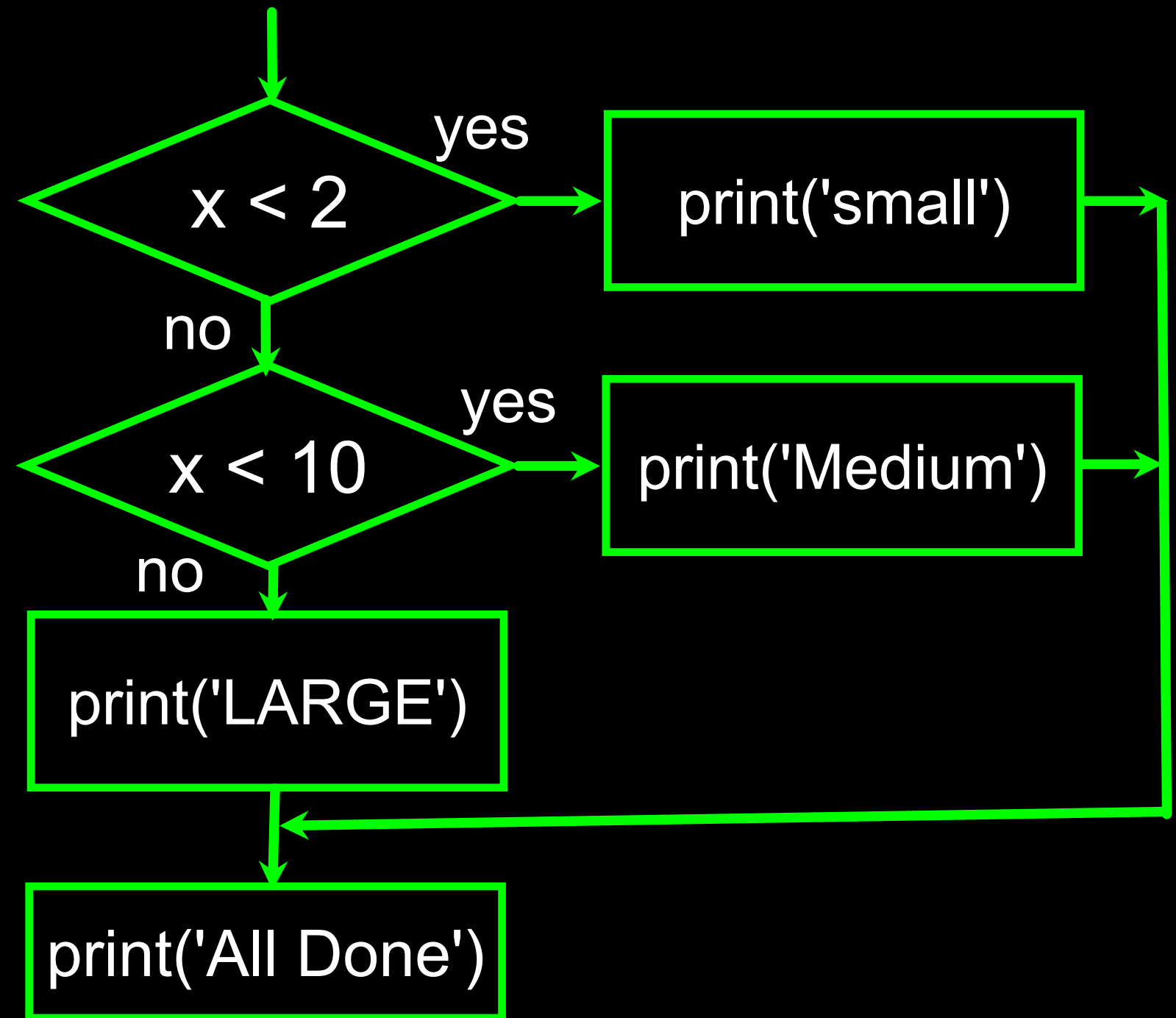
```
print('All done')
```



More Conditional Structures...

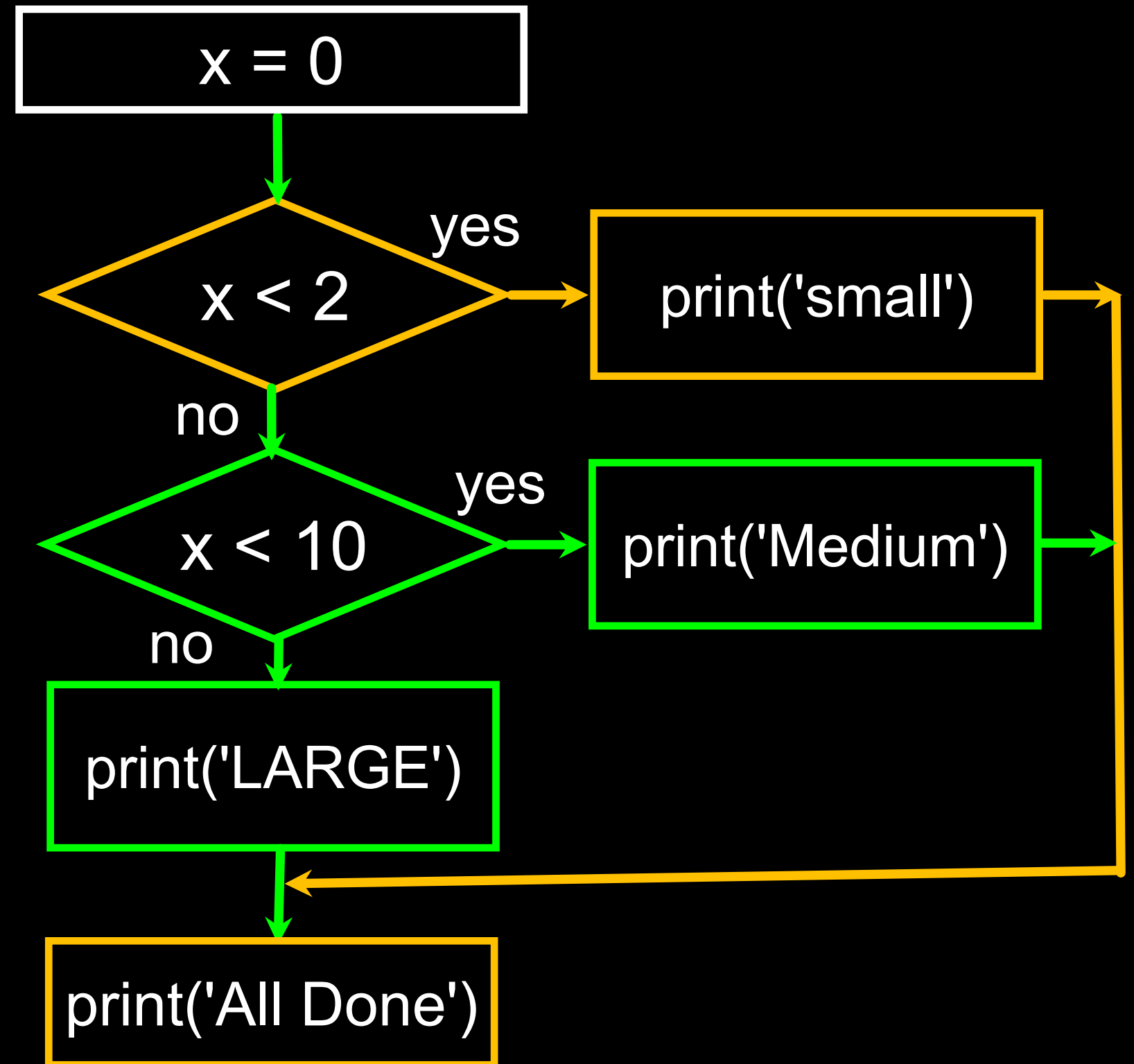
Multi-way

```
if x < 2 :  
    print('small')  
elif x < 10 :  
    print('Medium')  
else :  
    print('LARGE')  
print('All done')
```



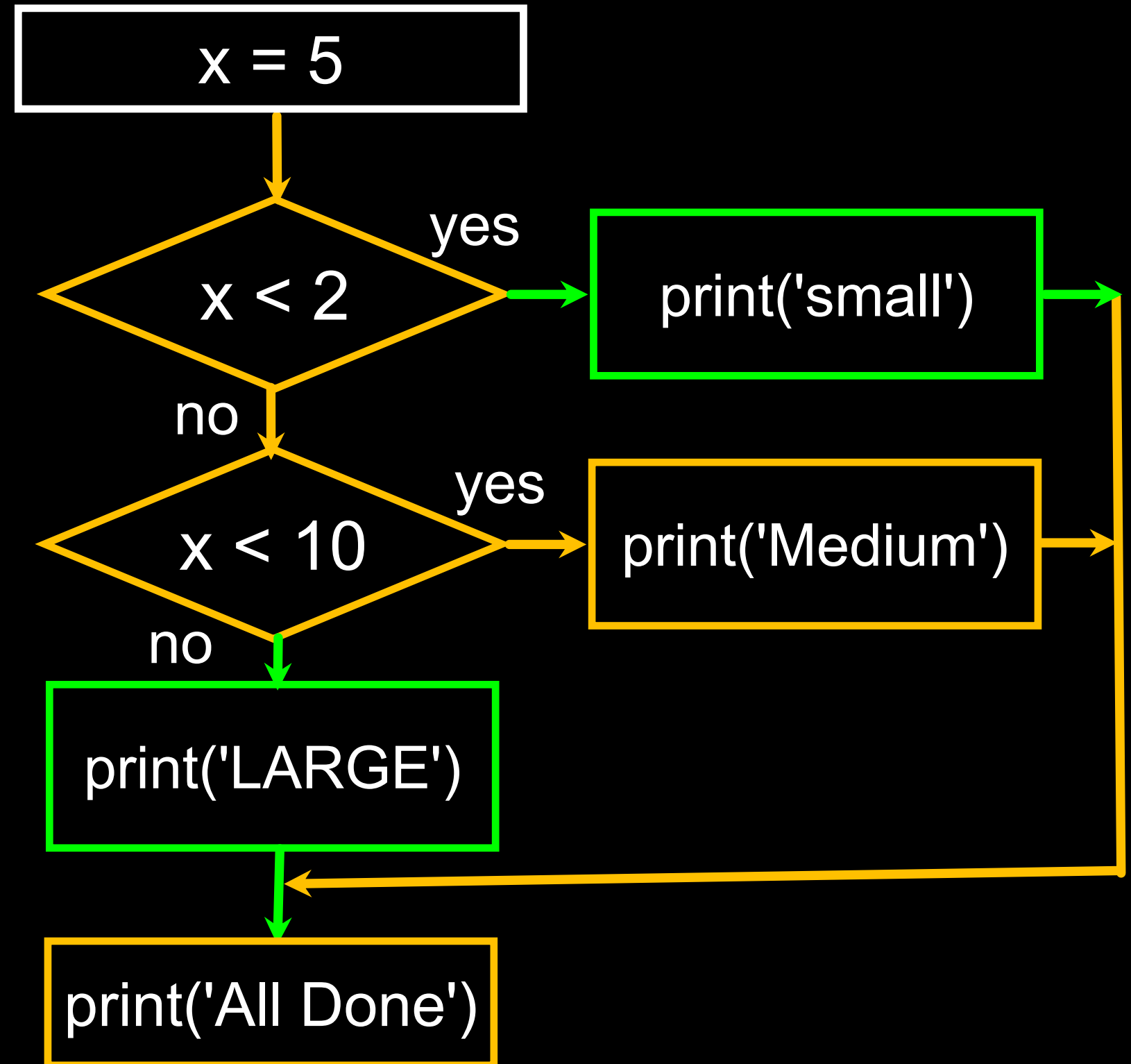
Multi-way

```
x = 0
if x < 2 :
    print('small')
elif x < 10 :
    print('Medium')
else :
    print('LARGE')
print('All done')
```



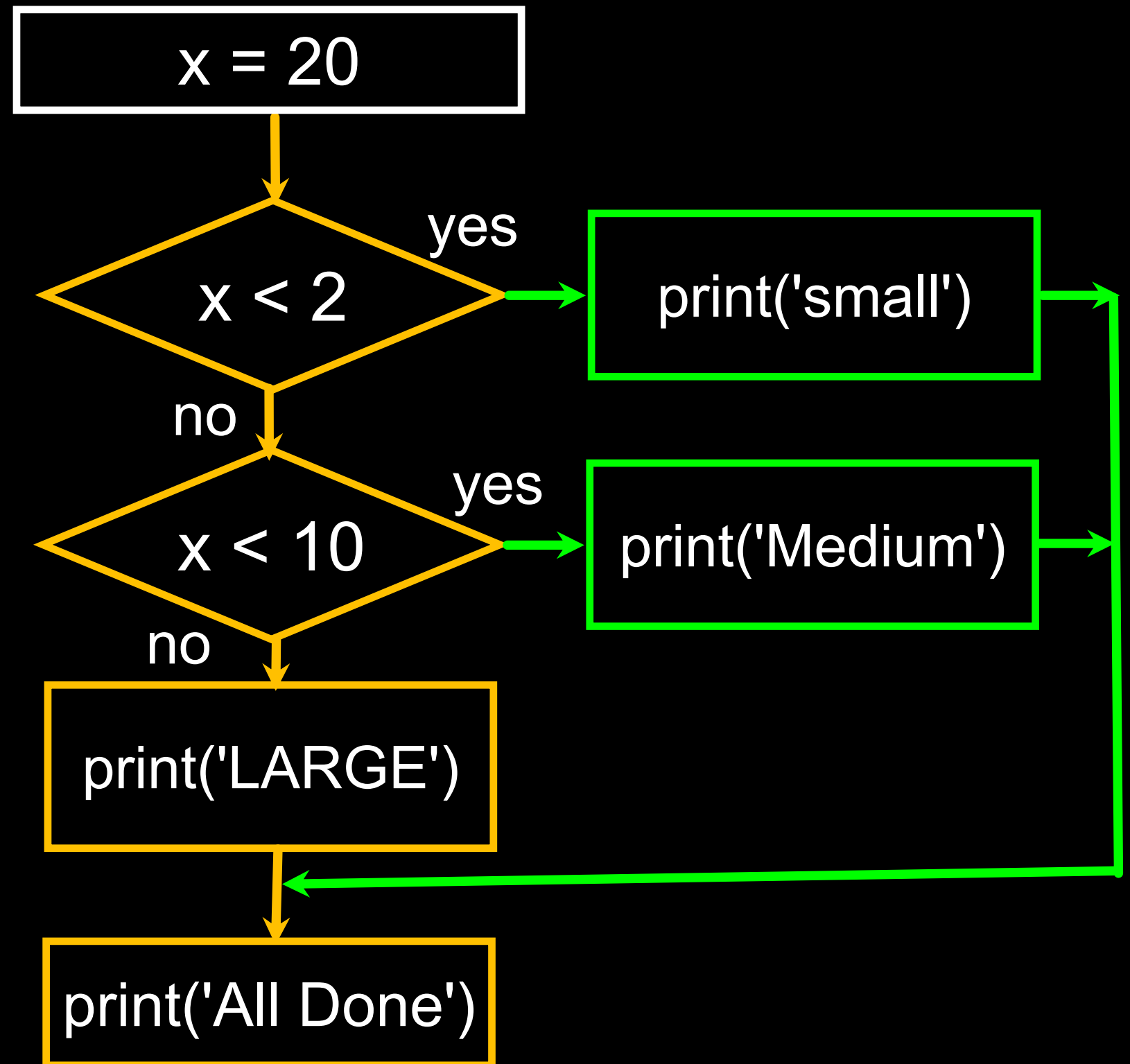
Multi-way

```
x = 5
if x < 2 :
    print('small')
elif x < 10 :
    print('Medium')
else :
    print('LARGE')
print('All done')
```



Multi-way

```
x = 20
if x < 2 :
    print('small')
elif x < 10 :
    print('Medium')
else :
    print('LARGE')
print('All done')
```



Multi-way

```
# No Else
x = 5
if x < 2 :
    print('Small')
elif x < 10 :
    print('Medium')

print('All done')
```

```
if x < 2 :
    print('Small')
elif x < 10 :
    print('Medium')
elif x < 20 :
    print('Big')
elif x < 40 :
    print('Large')
elif x < 100:
    print('Huge')
else :
    print('Ginormous')
```

Multi-way Puzzles

Which will never print
regardless of the value for x?

```
if x < 2 :  
    print('Below 2')  
elif x >= 2 :  
    print('Two or more')  
else :  
    print('Something else')
```

```
if x < 2 :  
    print('Below 2')  
elif x < 20 :  
    print('Below 20')  
elif x < 10 :  
    print('Below 10')  
else :  
    print('Something else')
```

The try / except Structure

- You surround a dangerous section of code with `try` and `except`
- If the code in the `try` works - the `except` is skipped
- If the code in the `try` fails - it jumps to the `except` section

```
$ cat notry.py
astr = 'Hello Bob'
istr = int(astr)
print('First', istr)
astr = '123'
istr = int(astr)
print('Second', istr)
```

```
$ python3 notry.py
```

```
Traceback (most recent call last):
File "notry.py", line 2, in <module>
istr = int(astr)ValueError: invalid literal
for int() with base 10: 'Hello Bob'
```

All
Done



The
program
stops
here

```
$ cat notry.py
astr = 'Hello Bob'
istr = int(astr)
```



```
$ python3 notry.py
```

```
Traceback (most recent call last):
File "notry.py", line 2, in <module>
istr = int(astr)ValueError: invalid literal
for int() with base 10: 'Hello Bob'
```

All
Done

```
astr = 'Hello Bob'
try:
    istr = int(astr)
except:
    istr = -1
print('First', istr)
```

When the first conversion fails - it just drops into the except: clause and the program continues.

```
$ python tryexcept.py
First -1
Second 123
```

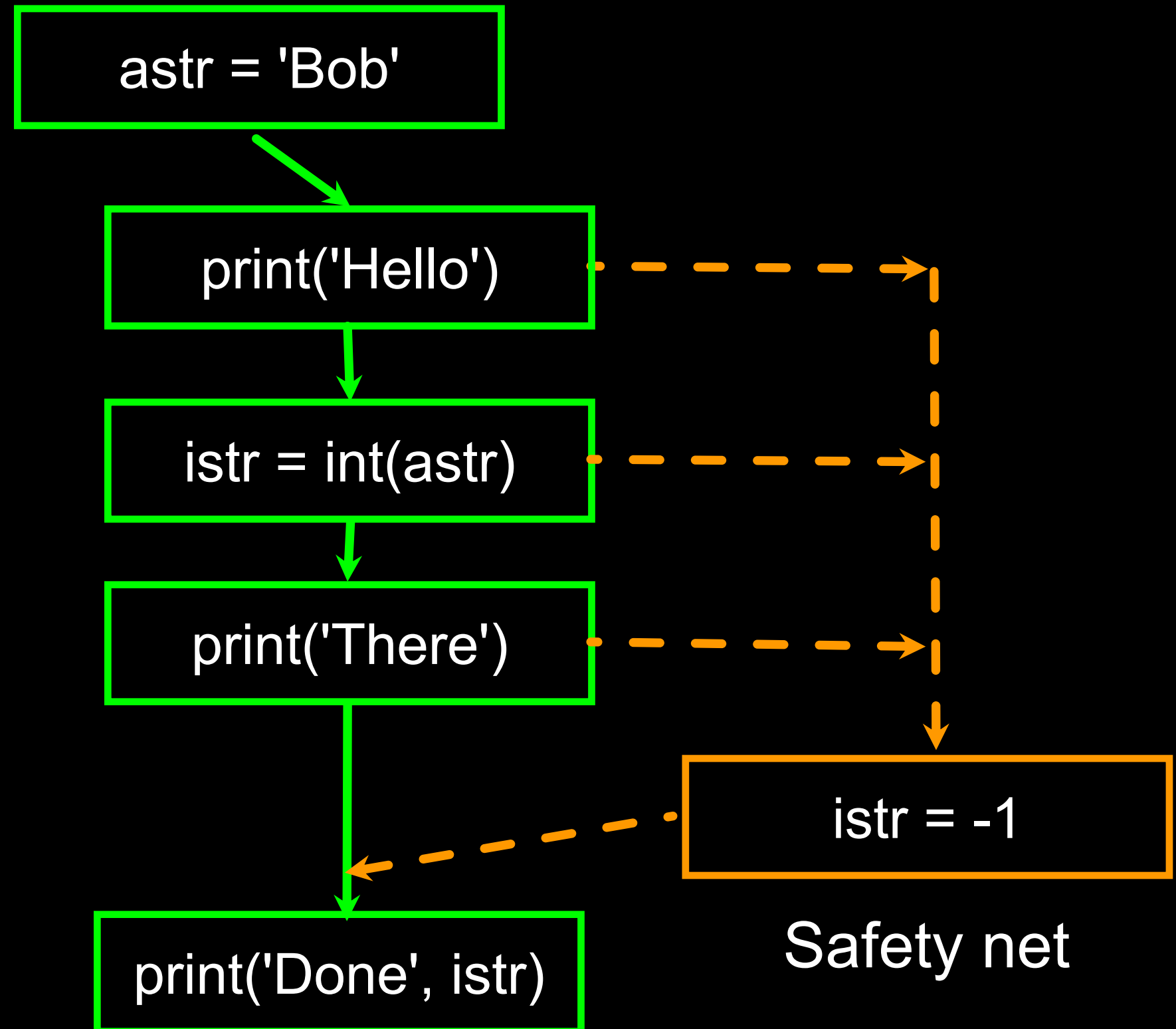
```
astr = '123'
try:
    istr = int(astr)
except:
    istr = -1
print('Second', istr)
```

When the second conversion succeeds - it just skips the except: clause and the program continues.

try / except

```
astr = 'Bob'
try:
    print('Hello')
    istr = int(astr)
    print('There')
except:
    istr = -1

print('Done', istr)
```



Sample try / except

```
rawstr = input('Enter a number:')
try:
    ival = int(rawstr)
except:
    ival = -1

if ival > 0 :
    print('Nice work')
else:
    print('Not a number')
```

```
$ python3 trynum.py
Enter a number:42
Nice work
$ python3 trynum.py
Enter a number:forty-two
Not a number
$
```