

Repetition in Programming

Basic Python

Repetition

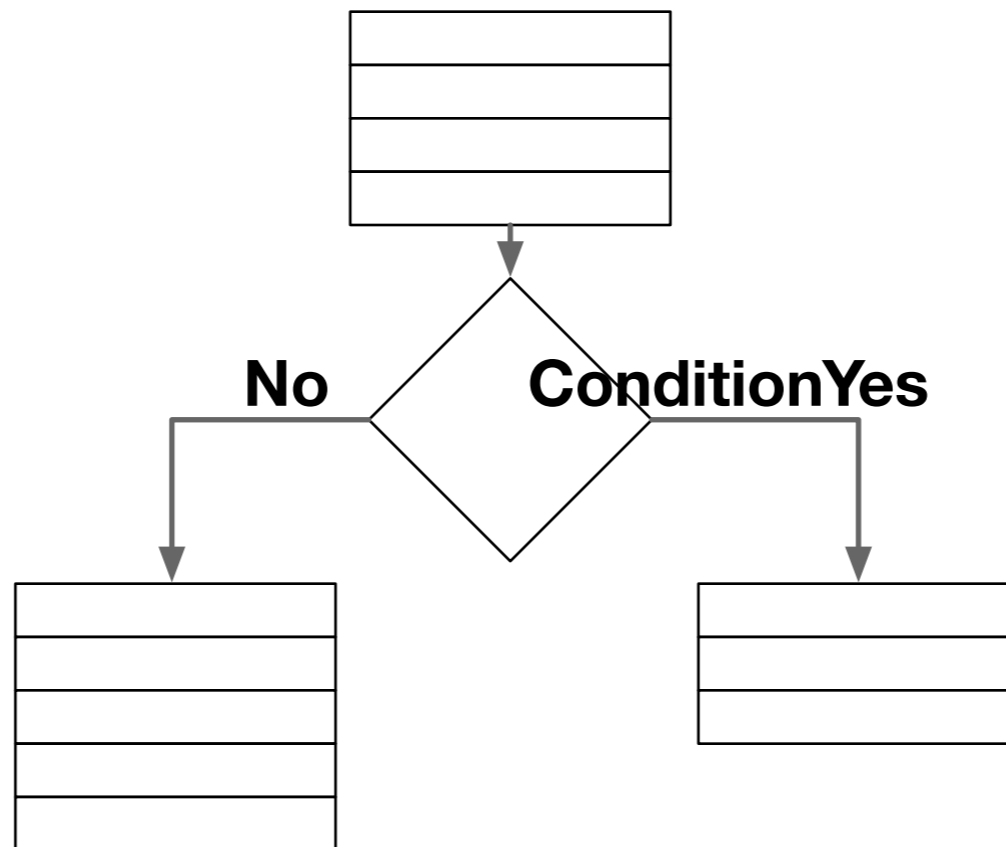
- Rarely is code executed only once
 - E.g. initialization, set-up, final reports, ...
- Typically, parts of code is repeated
 - Example:
 - Single Person Game uses an “event loop”
 - Player reacts usually by clicking
 - This is an event
 - Game processes the event and awaits the next event

Repetition

- Typical examples:
 - Do something repeatedly until a state changes to a certain value
 - Do something for a certain number of times
 - Do something while something is true

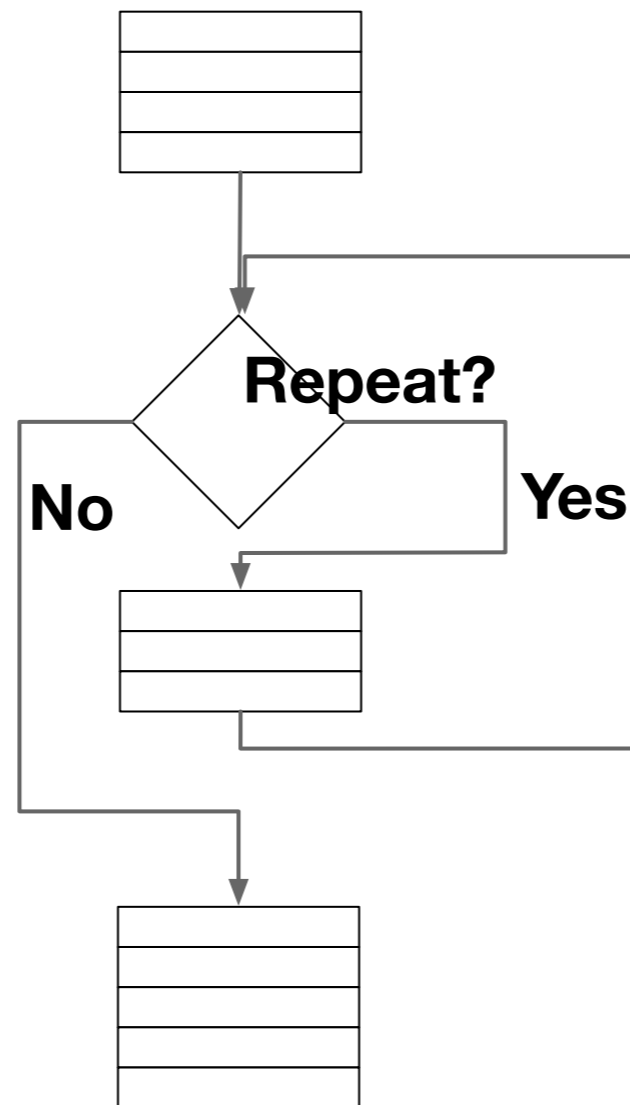
Repetition

- The general loop history
 - As we have seen with conditional statements, we need to control the flow of the program



Repetition

- For repetition, the control flow needs to point back



Repetition

- Traditionally, control flow was controlled with goto statements
 - But goto statements lead to code that is difficult to debug
 - Thus, more abstract constructs

Do/Repeat Until

- Example:
 - Use Heron's method to find a square root

```
epsilon = 10**-5 #precision
a = input('Enter a number: ')
y = 1 #initial guess
do:
    y = 1/2*(a+y/a) #better guess
until abs(y**2-a) < epsilon
print(y)
```

- Not needed in Python

Repetition

- Repeat n times

- Example

- ```
epsilon = 10**-5 #precision
a = input('Enter a number: ')
y = 1 #initial guess
repeat 5 times:
 y = 1/2*(a+y/a) #better guess
print(y)
```



# While Do

- While Do
  - Example:
    - Process a list of records
      - While we are not at the end, process the record

# Repetition in Python

- Python implements repetition with a
  - While loop
    - Implements directly the "while condition do" loop
  - For loop built on lists