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Decision Making

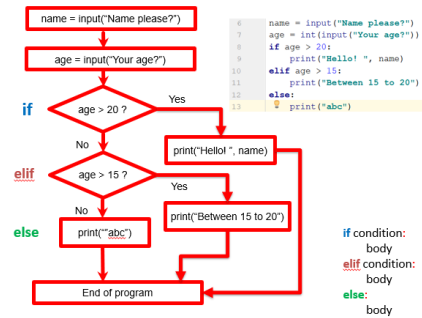
To be, or not to be

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Revisit Decision -> if

- Decision involves **comparison**.
- Compare numbers, compare texts.
- Compare using comparison operators to **results in Boolean values (True / False)**.
- Decision can be reached by using if, for, and while loop.
- Loop will be executed when the comparison results in True.



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Iterations / Loops

Keywords:
while
until
repeatedly
for

Goes rounds and rounds



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Types of Iterations

The number of iterations depends on the control condition, loop body will be executed so long as the control condition is true.

- **Definite loop**

- The number of iterations to be executed is known and set beforehand.
- Example: for loop **You must set the ending condition when the loop started**

- **Indefinite loop**

- The number of iterations to be executed is unknown and not set beforehand.
- Example: while loop **Ending → Set within the loop body**

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while condition

Steps:
1. Set starting value right
2. Set Control/Condition
3. Increment/Decrement

*If you do not have step 3, you will be in a dead loop.

- Test control condition then execute iterations when the condition is evaluated to be True
- Structure:

while condition:

<Indent> body

```

1  n = 0 start
2  while n < 10: condition
3      print(n)
4      n += 1
5  print("--The End--")

```

It will keep on looping until FALSE

When n=10 or above, it will jump to print("--The End --")

```

1  n = 10
2  while n >= 0:
3      print(n)
4      n -= 1
5  print("--The End--")

```

True; body of while loop will be executed
False; will not run the while loop

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Iteration + Decision -> while loop

- The basic about programming decision is still the same, involves **comparison**.
- Sometimes, we want to repeat the comparison as variable may have changed along the way. We then add in **iteration**.
- **Iteration repeats** so long as the **comparison** is **True**.
- When the comparison is **False**, **iteration ends**.

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While Loop

- Test control condition then execute iterations when the condition is evaluated to be True
- Structure:

while condition:
body

```

1 n = 0
2 while n < 10:
3     print(n)
4     n += 1
5 print("--The End--")

```

Steps:

1. Define a variable with **starting value**.
2. Define while loop with a **condition**.
3. Place the codes to repeat inside while loop as body (indent one level)

This example makes a while loop to repeat 10 times, printing out value from 0 to 9.

The condition is to be designed such that when it is True, the body repeats. When it is False, while loop ends.

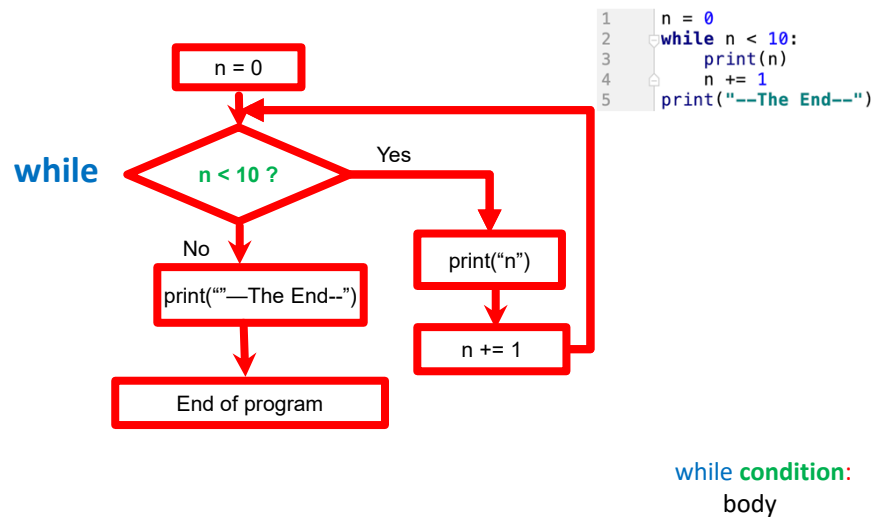
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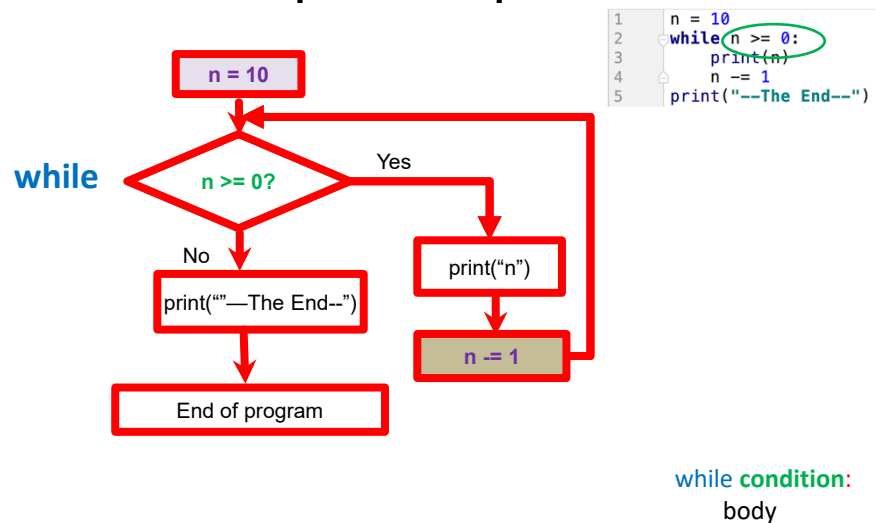
While Loop Example 1



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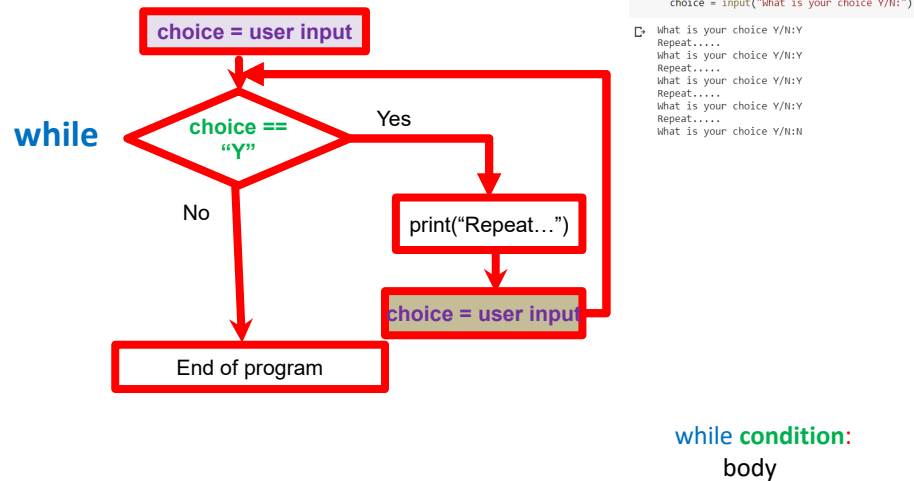
While Loop Example 2



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While Loop Example 3



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while example

```

1  conversion_rate = 0
2  lead_value = 0
3
4  try:
5      sales = float(input("Enter total number of sales:"))
6      leads = float(input("Enter the number of leads:"))
7      sales_value = float(input("Enter the value of sales:"))
8      while leads <= 0:
9          leads = float(input("Enter the number of leads:"))
10         conversion_rate = sales / leads * 100
11         lead_value = sales_value / leads
12     except ValueError:
13         print("Enter a valid number:")
14     print("The conversion rate is: ", conversion_rate)
15     print("The lead value is: ", lead_value)
16     if conversion_rate > 30 and lead_value > 100:
17         print("Worth continuing.")
18     else:
19         print("Investigate other means.")
  
```

← Indefinite Loop

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Iteration + Decision -> for loop

- For loop is similar to while loop, it is for repetition.
- The construction of for loop is more clear cut and variable definition, condition comparison are in one central place.
- **Iteration repeats** so long as the **comparison** is **True**.
- When the comparison is **False**, **iteration ends**.

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For loop

- Designed for repetition by stepping through the variable.
- For loop in python is versatile.
- It creates **repetition** by making use of a standard library function: **range()**
 - **range()** gives a list of numbers based on the given criteria.
 - The numbers are then used one after another until the last number.
- Loop body is executed so long as the variable has not reached stop value,
- Each **iteration increases/decreases** the variable by step value.
- Structure:
 - **for variable in range(start, stop, step):**
body

It will construct a list of numbers

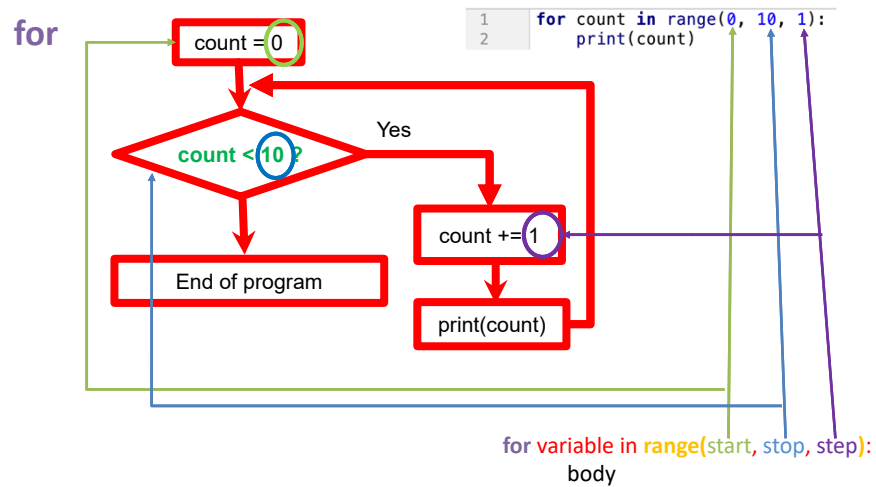
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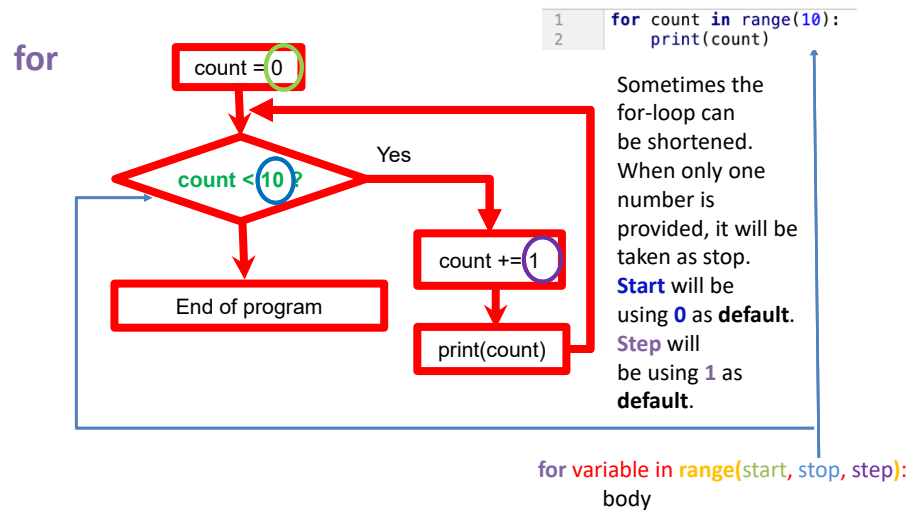
For Loop Example 1



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For Loop Example 2



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You have learnt...

1. To use if and while in python to make decision.
2. That if is for one time comparison.
3. That while is for indefinite loop repetition.
4. The construction of for loop.

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