Conditional statements and operators

INTRODUCTION TO PYTHON FOR DEVELOPERS

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Booleans

```python
# Boolean variable
the_truth = True
print(the_truth)
```

```
True
```

- Used to make comparisons

Operators

- Comparison operators
  - Symbols or combinations of symbols
  - Used to compare values
- Check if two things are equal
  - `==`

Checking for equality

```
# Compare if 2 is equal to 3
2 == 3
```

```
False
```

```
# Check that 2 is not equal to 3
2 != 3
```

```
True
```

- Common use-case: checking login details

Numeric comparison operators

```
# Is 5 less than 7?
5 < 7
```

```
True
```

```
# Is 5 greater than 7?
5 > 7
```

```
False
```

```
# Is 5 less than or equal to 7?
5 <= 7
```

```
True
```

```
# Is 5 greater or equal to 7?
5 >= 7
```

```
False
```

Other comparisons

```python
# Is James greater than Brian
"James" > "Brian"
```

```
True
```

- Strings are evaluated in alphabetical order

Conditional statements

- `if` condition is met, then perform action, otherwise skip

```
# Check pasta quantities
required_quantity = 500
pasta_quantity = 200

# Compare pasta quantities
if pasta_quantity >= required_quantity
```

Conditional statements

- `if` condition is met, then perform action, otherwise skip

```python
# Check pasta quantities
required_quantity = 500
pasta_quantity = 200

# Compare pasta quantities
if pasta_quantity >= required_quantity:
```

Conditional statements

- `if` condition is met, then perform action, otherwise skip

```
# Check pasta quantities
required_quantity = 500
pasta_quantity = 200

# Compare pasta quantities
if pasta_quantity >= required_quantity:
    print("You have enough pasta!")
```

Indentation

```python
# Check pasta quantities
required_quantity = 500
pasta_quantity = 200

# Compare pasta quantities
if pasta_quantity >= required_quantity:
print("You have enough pasta!") # This line is not indented
```

```
    print("You have enough pasta!")
    ^
IndentationError: expected an indented block
```

Elif statement

```python
# Check pasta quantities
required_quantity = 500
pasta_quantity = 200
# Compare pasta quantities
if pasta_quantity >= required_quantity:
    print("You have enough pasta!")
elif pasta_quantity >= 300:
    print("Nearly enough pasta. Try a smaller portion.")
```

- Can use as many `elif` keywords as we like!

Else statement

```python
# Check pasta quantities
required_quantity = 500
pasta_quantity = 200
# Compare pasta quantities
if pasta_quantity >= required_quantity:
    print("You have enough pasta!")
elif pasta_quantity >= 300:
    print("Nearly enough pasta. Try a smaller portion.")
# Otherwise...
else:
    print("Not enough pasta.")
```

```
Not enough pasta.
```

Comparison operators cheat sheet

Operator	Function
`==`	Equal to
`!=`	Not equal to
`>`	More than
`>=`	More than or equal to
`<`	Less than
`<=`	Less than or equal to

Keyword	Function	Use
`if`	If condition is met	First in the workflow
`elif`	Else check if condition is met	After `if`
`else`	Else perform this action	After `elif`

Let's practice!

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For loops

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Individual comparisons

```python
# Ingredient quantities
quantities = [500, 400, 15, 20, 30, 5]
```

```python
# Validate values
quantities[0] < 10
```

```
False
```

```python
quantities[1] < 10
```

```
False
```

For loop syntax

```python
for value in sequence:
    action
```

- `for` each `value` in `sequence`, perform this `action`
  - `action` is indented because of the colon in the previous line
- `sequence` = iterable e.g., list, dictionary, etc.
- `value` = iterator, i.e., the index
  - Placeholder (can give it any name), `i` is common

Print individual values

```python
# Ingredients list
ingredients = ["pasta", "tomatoes", "garlic", "basil", "olive oil", "salt"]

# Loop through and print each ingredient
for ingredient in ingredients:
    print(ingredient)
```

```
pasta
tomatoes
garlic
basil
olive oil
salt
```

Conditional statements in for loops

```python
quantities = [1000, 800, 40, 30, 30, 15]


for qty in quantities:
```

Conditional statements in for loops

```
quantities = [1000, 800, 40, 30, 30, 15]

for qty in quantities:
    # Check if quantity is more than 500
    if qty > 500:
      print("Plenty in stock")
    elif qty >= 100:
        print("Enough for a small portion")
    else:
        print("Nearly out!")
```

Conditional statements in for loops

```
Plenty in stock
Enough for small
Nearly out!
Nearly out!
Nearly out!
```

Looping through strings

```python
ingredient_name = "pasta"
# Loop through each character
for letter in ingredient_name:
    print(letter)
```

```
p
a
s
t
a
```

- Useful for validating text, checking for special characters

Looping through dictionaries

```python
ingredients = {"pasta": 500, "tomatoes": 400, "garlic": 30}

# Loop through keys and values
for item, qty in ingredients.items():
    print(item, ":", qty, "grams")
```

```
pasta : 500 grams
tomatoes : 400 grams
garlic : 30 grams
```

- `item` = key (ingredient name)
- `qty` = value (quantity)

Looping through dictionaries

```python
ingredients = {"pasta": 500, "tomatoes": 400, "garlic": 30}
factor = 2
# Calculate scaled quantities
for item, qty in ingredients.items():
    scaled_qty = qty * factor
    print(item, ":", scaled_qty, "grams")
```

```
pasta : 1000 grams
tomatoes : 800 grams
garlic : 60 grams
```

Looping through dictionaries

```
# Loop through keys only
for item in ingredients.keys():
    print(item)
```

```
pasta
tomatoes
garlic
```

```
# Loop through values only
for qty in ingredients.values():
    print(qty, "grams")
```

```
500 grams
400 grams
30 grams
```

Range

```
range(start, end + 1)
```

- `start` = starting number
- `end` = ending number
- Used to generate or modify values

```
for i in range(1, 6):
    print(i)
```

```
1
2
3
4
5
```

Let's practice!

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While loops

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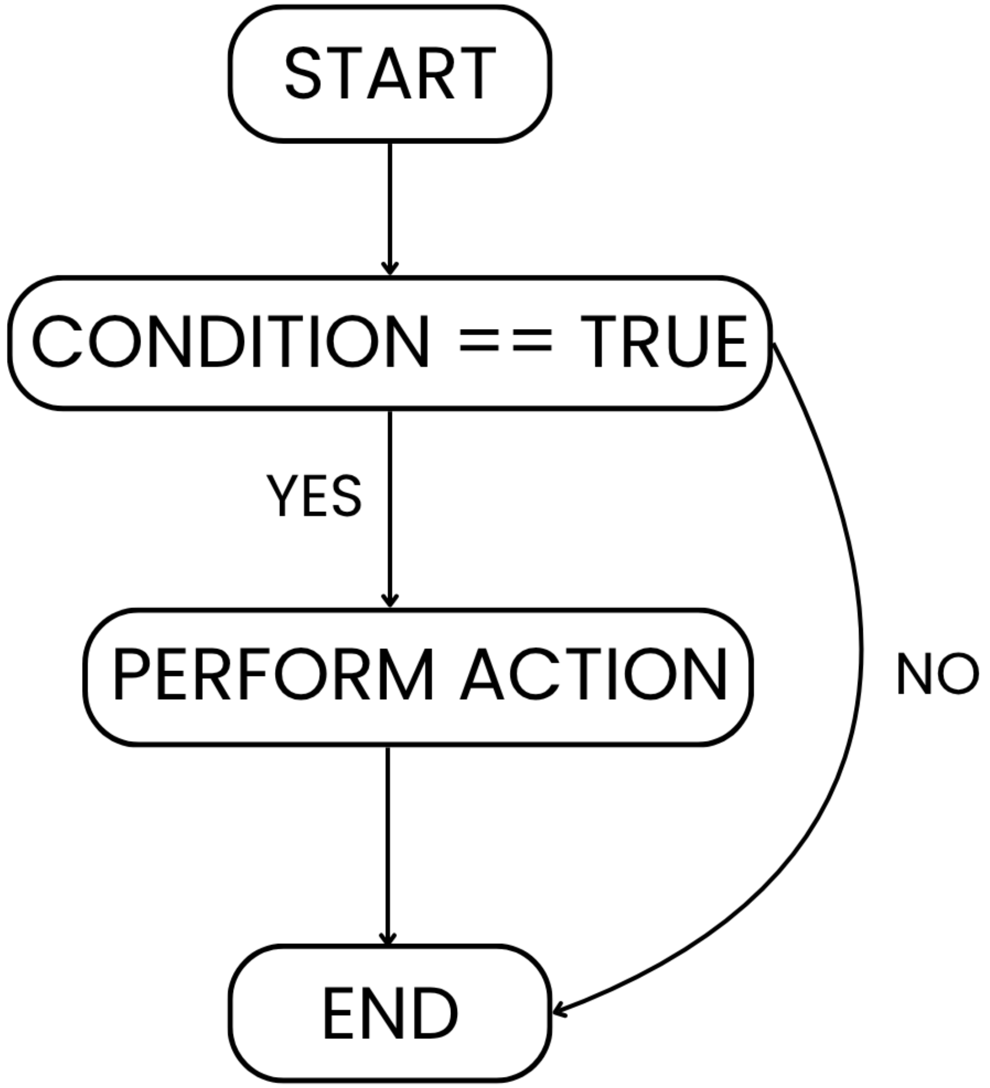
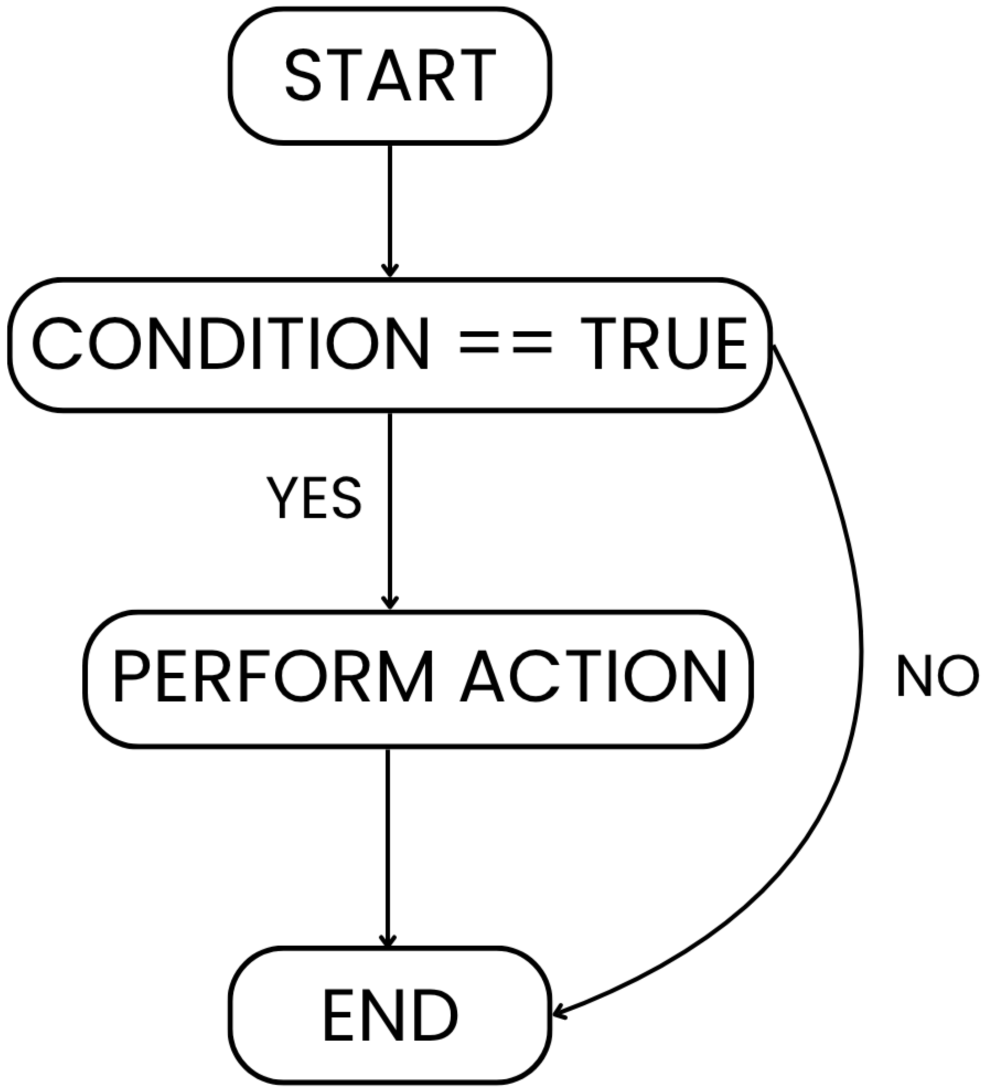
If statement

If statement

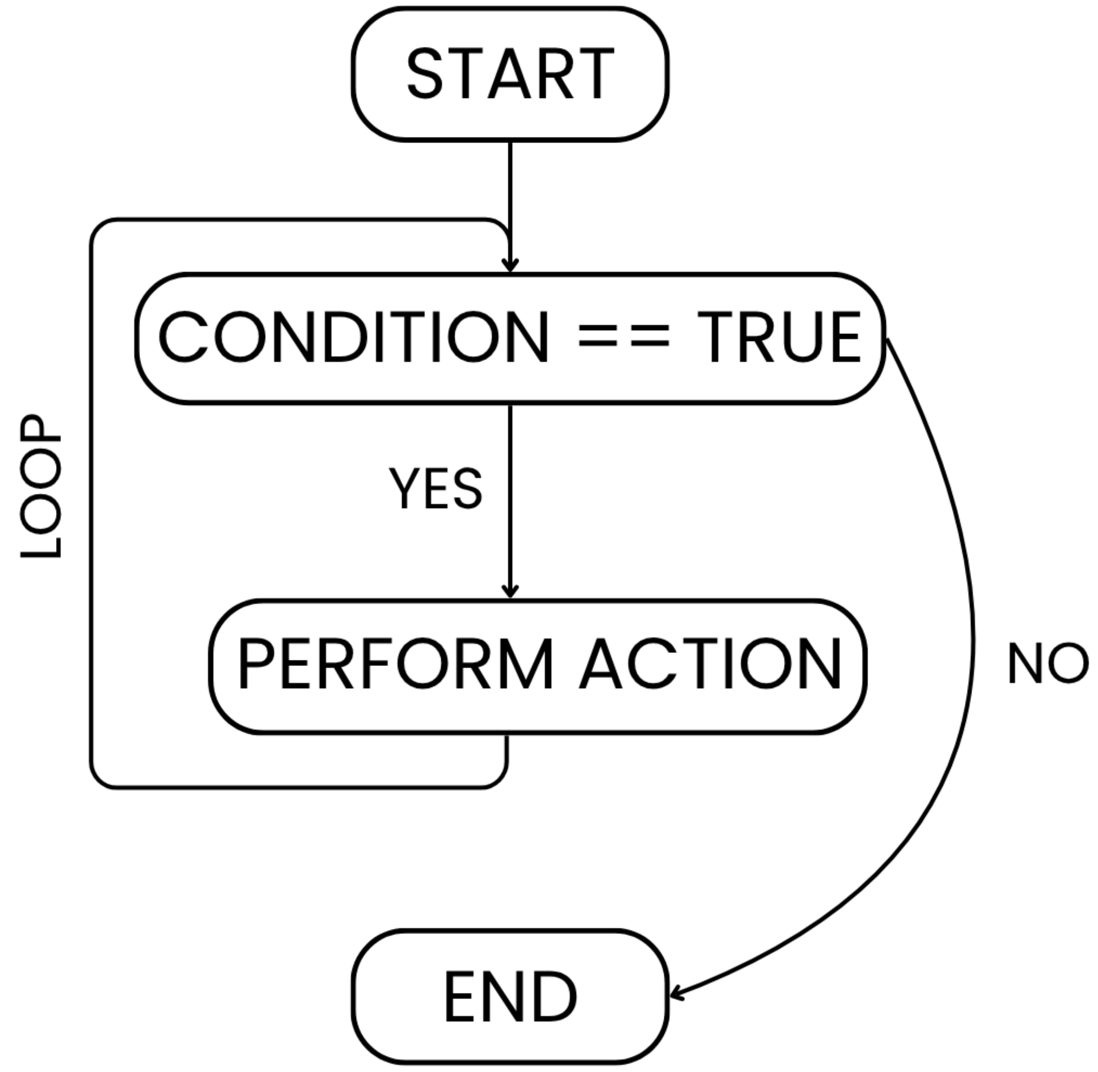


If statement versus while loop

If statement



While loop



While loop

```
while condition:
    action
```

- Any continuous task
    - Accelerate `while` a button is pressed

[1] https://unsplash.com/@joaoscferrao

While loop

```python
ingredients_to_add = 5
items_added = 0
```

```python
# Keep adding while we have items left
while items_added < ingredients_to_add:
    items_added += 1
    remaining = ingredients_to_add - items_added
    print(remaining, "ingredients left to add")
```

Output

```
4 ingredients left to add
3 ingredients left to add
2 ingredients left to add
1 ingredients left to add
0 ingredients left to add
```

- Loop exits when `items_added` equals `ingredients_to_add`

A word of caution

- `while` runs continually while the condition is met

```
ingredients_to_add = 5
items_added = 0

while items_added < ingredients_to_add:
    remaining = ingredients_to_add - items_added
    print(remaining, "ingredients left")
```

Running forever

```python
ingredients_to_add = 5
items_added = 0

# INFINITE LOOP - never exits!
while items_added < ingredients_to_add:
    remaining = ingredients_to_add - items_added
    print(remaining, "ingredients left")
    # Forgot to increment items_added!
```

- Condition never becomes False
- Loop runs forever, program freezes
- Common developer mistake

Breaking a loop

```
while items_added < ingredients_to_add:
    remaining = ingredients_to_add - items_added
    print(remaining, "ingredients left")

    # Terminate the loop
    break
```

- `break` can also be used in `for` loops
- If the code is already running: Control + C / Command + C

Conditional statements within while loops

```python
ingredients_to_add = 5
items_added = 0

while items_added < ingredients_to_add:
    items_added += 1
    remaining = ingredients_to_add - items_added
    if remaining > 3:
        print("Several ingredients remaining")
    elif remaining >= 1:
        print("Almost done!")
    else:
        print("Shopping list complete!")
```

Conditional statements output

```
Several ingredients remaining
Several ingredients remaining
Almost done!
Almost done!
Shopping list complete!
```

Let's practice!

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Building a workflow

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Complex workflows

- Loops through data structures
  - `for` , `while`
- Evaluate multiple conditions
  - `if` , `elif` , `else` , `>` , `>=` , `<` , `<=` , `==` , `!=`
- Update variables
  - `+=`
- Return outputs
  - `print()`

The "in" keyword

- `in` = check if a value is **in** a variable/data structure

```
recipe = {"pasta": 500, "tomatoes": 400,
          "garlic": 15, "basil": 20}

if "pasta" in recipe.keys():
    print(True)
else:
    print(False)
```

```
True
```

- Faster than looping through every key

The "not" keyword

- `not` = check if a condition **is not** met
- Useful for validating that something is missing

```python
pantry_items = ["flour", "sugar", "olive oil"]
# Check if "salt" is NOT in our pantry
if "salt" not in pantry_items:
    print(True)
else:
    print(False)
```

```
True
```

The "and" keyword

- `and` = check if **multiple conditions** are met
- Use when multiple requirements must be met

```python
pasta_quantity = 600
olive_oil_quantity = 30
# Check if we have enough of BOTH ingredients
if pasta_quantity >= 500 and olive_oil_quantity >= 30:
    print(True)
else:
    print(False)
```

```
True
```

The "or" keyword

- `or` = check if one (**or more**) condition is met
- Use when any of several options are acceptable

```python
pasta_quantity = 600
olive_oil_quantity = 30
# Check if we have enough of EITHER ingredient
if pasta_quantity >= 500 or olive_oil_quantity >= 30:
    print(True)
else:
    print(False)
```

```
True
```

Adding/subtracting from variables

- Combine keywords with other techniques to build complex workflows

```python
ingredients_checked = 0
for ingredient in recipe_list:
    # ingredients_checked = ingredients_checked + 1
    ingredients_checked += 1
items_to_buy = 10
for item in shopping_list:
    # items_to_buy = items_to_buy - 1
    items_to_buy -= 1
```

- `+=` adds to a variable, `-=` subtracts from it
- Other ways to update variables

Appending

- Store information that meets specific criteria in a list

```
# Create empty list to hold results
shopping_list = []

# Loop through recipe ingredients
for ingredient, qty_needed in recipe.items():
    # Check if we need to buy it
    if ingredient not in pantry:
        # Add to shopping list
        shopping_list.append(ingredient)
```

Appending

```
print(shopping_list)
```

```
['tomatoes', 'salt']
```

Let's practice!

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Congratulations!

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Chapter 1 recap

```python
# Define quantity
quantity = 10

# Single quotes
ingredient_name = 'pasta'

# Double quotes also work
ingredient_name = "pasta"
```

Chapter 2 recap

```python
ingredient_name = "Basil Leaves"

# Convert to lowercase
ingredient_name = ingredient_name.lower()
```

```python
# List of ingredients
ingredients = ["pasta", "tomatoes", "garlic",
               "basil", "olive oil", "salt"]
# Get the value at the first index
ingredients[0]
```

```python
# Creating a dictionary
recipe_dict = {"pasta": 500,
               "tomatoes": 400,
               "garlic": 15,
               "basil": 20,
               "olive oil": 30,
               "salt": 5}
```

```python
# Create a set
ingredients_set = {"pasta", "tomatoes", "pasta",
                   "basil", "garlic", "olive oil",
                   "salt"}
# Create a tuple
serving_sizes = (1, 2, 4, 6, 8)
```

Chapter 3 recap

Operator	Function
`==`	Equal to
`!=`	Not equal to
`>`	More than
`>=`	More than or equal to
`<`	Less than
`<=`	Less than or equal to

Keyword	Function	Use
`if`	If condition is met	First in the workflow
`elif`	Else check if condition is met	After `if`
`else`	Else perform this action	After `elif`

Chapter 3 recap

```python
# Ingredients list
ingredients = ["pasta", "tomatoes", "garlic", "basil", "olive oil", "salt"]

# Loop through and print each ingredient
for ingredient in ingredients:
    print(ingredient)
```

```
pasta
tomatoes
garlic
basil
olive oil
salt
```

Chapter 3 recap

```python
ingredients_to_add = 5
items_added = 0

while items_added < ingredients_to_add:
    items_added += 1
    remaining = ingredients_to_add - items_added

    if remaining > 3:
        print("Several ingredients remaining")
    elif remaining >= 1:
        print("Almost done!")
    else:
        print("Shopping list complete!")
```

Chapter 3 recap

Keyword	Function
`and`	Evaluate if multiple conditions are true
`or`	Evaluate one or more conditions are true
`in`	Evaluate if a value is in a data structure
`not`	Evaluate if a value is not in a data structure

- `list.append()`

Next steps

- Additional built-in functions
  - `zip()`
  - `enumerate()`
- Packages and modules
  - `os`
  - `time`
  - `venv`
  - `pandas`
  - `requests`
  - `numpy`

- Building custom functions

- **Intermediate Python for Developers** course on DataCamp

Congratulations!

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