CSCI 1030U - Intro to Computer Science @IntroCS

Randy J. Fortier @randy\_fortier



# Outline

- Conditionals
  - if statements
  - if/else statements
  - if/elif/else statements
  - Conditional expressions







- A conditional is a programming language statement that optionally executes a block of code
  - Conditionals evaluate a condition, which is an expression of Boolean type
  - If the condition is true, the code block is executed
  - If the condition is false, the code block is ignored



#### Conditionals - If

- An if statement is the most common conditional statement
  - An if statement evaluates a condition, which is an expression of Boolean type
    - If the condition is true, the code block is executed
    - If the condition is false, the code block is ignored

#### Conditionals - If

```
pokemon_hp = -2
pokemon_name = 'Tepig'
if pokemon_hp < 0:</pre>
    print(f'{pokemon_name} has fainted!')
print('All done')
```

#### Conditionals - If

```
pokemon_hp = 5
pokemon_name = 'Tepig'
if pokemon_hp < 0:</pre>
    print(f'{pokemon_name} has fainted!')
print('All done')
```

### Conditionals - If/Else

- An if statement can also have an else clause
  - An if statement evaluates a condition, which is an expression of Boolean type
    - If the condition is true, the code block in the if clause is executed
    - If the condition is false, the code block in the else clause is executed

# Python: if value < 10: print('Small') else: print('Not small')</pre>

```
C++:
if (value < 10) {
    cout << "Small";
} else {
    cout << "Not small";
}</pre>
```

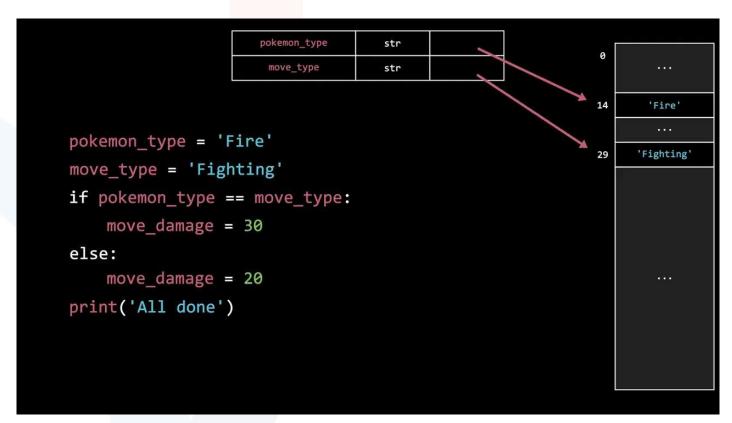
## Conditionals - If/Else

```
pokemon_type = 'Fire'
move_type = 'Fire'
if pokemon_type == move_type:
   move_damage = 30
else:
   move_damage = 20
print('All done')
```

# Conditionals - If/Else

```
pokemon_type = 'Fire'
move_type = 'Fighting'
if pokemon_type == move_type:
   move_damage = 30
else:
   move_damage = 20
print('All done')
```

# Conditionals - Mutually Exclusive



- An if statement can also have an elif or else if clause
  - An elif clause is an additional condition
    - If the *if* condition is false, the *elif* condition(s) are then checked (in order)
    - Finally, the else code is executed if none of the previous conditions are true

#### **Python:**

```
if value < 10:
    print('Small')
elif value < 20:
    print('Medium')
else:
    print('Large')</pre>
```

```
C++:
if (value < 10) {
    cout << "Small";
} else if (value < 20) {
    cout << "Medium";
} else {
    cout << "Large";
}</pre>
```

```
opponent_type = 'Fire'
if opponent_type == 'Fire':
   move_damage = 10
elif opponent type == 'Water':
   move_damage = 30
else:
   move_damage = 20
print('All done')
```

```
opponent_type = 'Water'
if opponent_type == 'Fire':
   move damage = 10
elif opponent_type == 'Water':
    move damage = 30
else:
   move_damage = 20
print('All done')
```

```
opponent_type = 'Grass'
if opponent type == 'Fire':
   move damage = 10
elif opponent_type == 'Water':
   move_damage = 30
else:
   move_damage = 20
print('All done')
```

#### A Note on Testing

- When testing a program, it is important to test all code paths
  - In a conditional, there are at least two code paths:
    - If the condition is true (if)
    - If the condition is false (else)
    - Each elif condition is another code path
- The ideal is to use different inputs to test each of these code paths
  - This is called 100% code coverage



#### **Demo - Conditionals**



## Programming Exercise 02b.1

 Write a program that asks the user for two numbers, and outputs the message Both numbers are even only if both numbers are even



# Programming Exercise 02b.2

- Write a program that checks the value of the health\_points variable
  - If health\_points is less than or equal to 0, then set the variable is dead to True
  - If health\_points is greater than 0, then set the variable is\_dead to False



### Programming Challenge 02b.1

- Write a program that asks the user for a single mark (out of 100), and outputs the letter grade that corresponds to that mark
- Use the following ranges:

```
- 0-49: F

- 50-59: D

- 60-69: C

- 70-79: B

- 80-100: A
```



#### Hackers' Corner

- Conditional expressions
  - Also called the ternary operator, this is a shortcut operator for choosing between two values:

#### Python:

```
maximum = x if x > y else y
```

#### C++:

```
int maximum = x > y ? x : y;
```



# Wrap-up

- Conditionals
  - if statements
  - if/else statements
  - if/elif/else statements
  - Conditional expressions



# Coming Up

- Loops
  - For loops
  - While loops

