

# DATA FLOW

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An Introduction to Computer Science



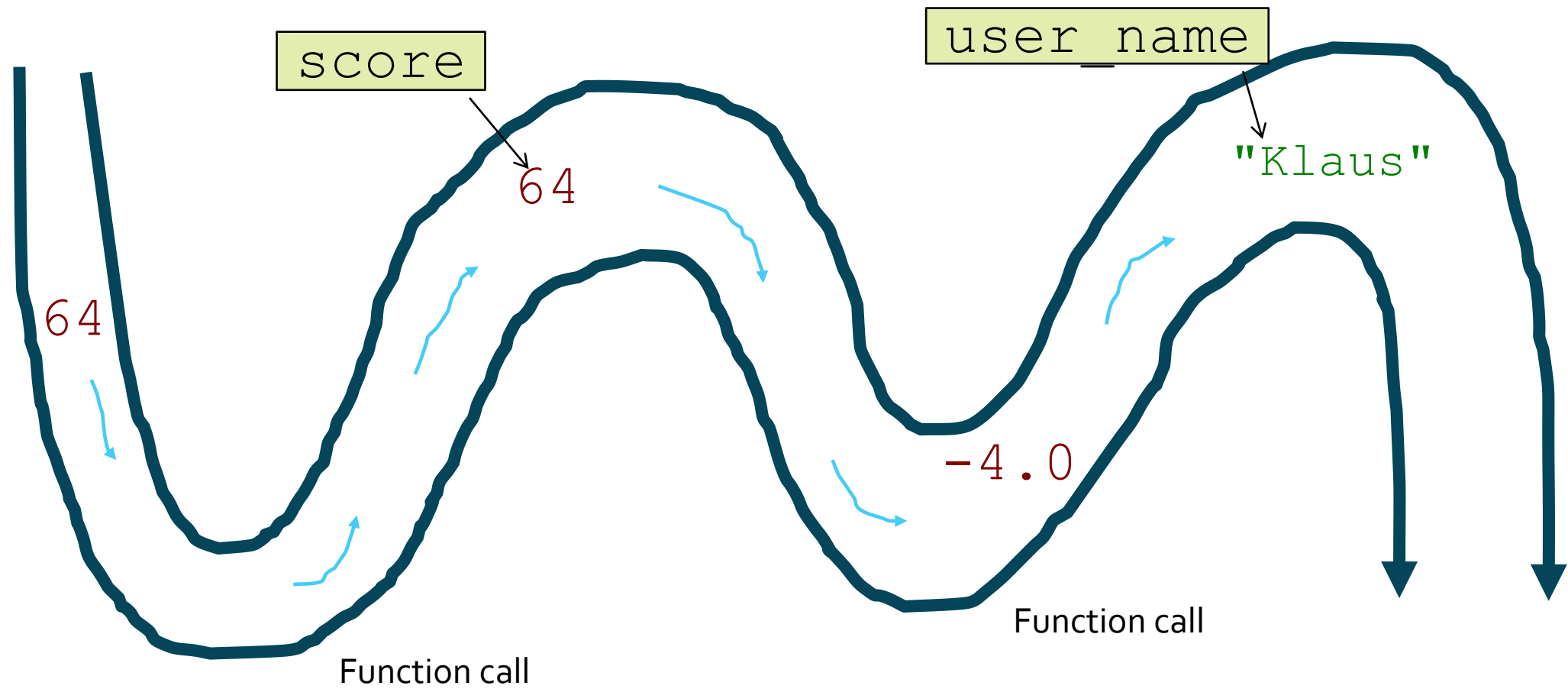
# Scope and Values

Reminder of rules:

1. Variables inside a function cannot be used outside
2. Variables outside a function should not be used inside
3. Function return values, not variables



# Data Flow



# Substitution

```
def add(left, right):  
    return left + right
```

5 + add(**7**, 4)



# Call Frame

```
def add_period(text: str) -> str:  
    result = text + "."  
    return result
```

```
message = "Hello world"  
add_period(message)
```

Frame: add\_period

```
text: str  
result: str
```

Frame: Global

```
message: str
```



# Data between Functions

```
def calculate_grade(raw, weight):  
    grade = 10 * (weight+raw) ** .5  
    return grade
```

```
def make_grade_message(grade):  
    return "Your grade was:" + str(grade)
```

```
raw = 45  
weight = 5  
grade = calculate_grade(raw, weight)  
message = make_grade_message(grade)  
print(message)
```

These variables are distinct from the ones below with the same name!

These lines actually move values between functions!



# Functions Calling Functions

```
def add5(number: int) -> int:  
    result = number + 5  
    return result
```

```
def double_and_add5(value: int) -> int:  
    answer = 2 * add5(value)  
    return answer
```

```
final = double_and_add5(7)
```

Frame: add5

```
number: int  
result: int
```

Frame: double\_add5

```
value: int  
answer: int
```

Frame: Global

```
final: int
```

