

`print("Hello World");`

2 Human

Readable

`cout << "Hello";`

Python

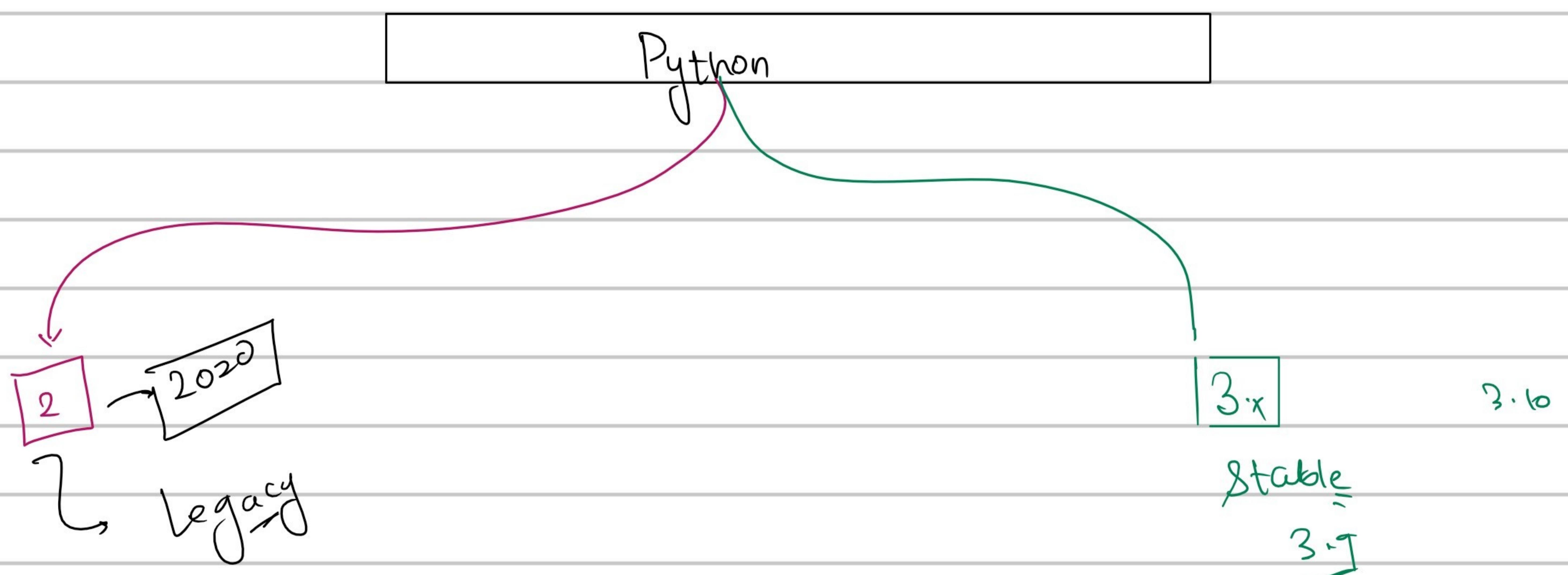
low learning curve
Python is a high level, interpreted
E a general purpose dynamic programming
language which focus on

CODE || READABILITY

Why Python?

- * Large Ecosystem → there are tons of libraries available for python
- * Huge Community Support

* Versions of Python *



Data Types In Python

Type

Text

Numeric

Sequence

Map

Set

Boolean

Binary

Data Type

str

int, float, complex

list, tuple, range

dict

set, frozenset

bool

byte, bytearray, memoryview

Keywords in Python

Keyword	Description
and	A logical operator
as	To create an alias
assert	For debugging
break	To break out of a loop
class	To define a class
continue	To continue to the next iteration of a loop
def	To define a function
del	To delete an object
elif	Used in conditional statements, same as else if
else	Used in conditional statements
except	Used with exceptions, what to do when an exception occurs
catch	

Keywords	Description
False	Boolean value, result of comparison operations
finally	Used with exceptions, a block of code that will be executed no matter if there is an exception or not
for	To create a for loop
from	To import specific parts of a module
global	To declare a global variable
if	To make a conditional statement
import	To import a module
in	To check if a value is present in a list, tuple, etc.
is	To test if two variables are equal
lambda	To create an anonymous function

Keywords in Python

Keyword	Description
None	Represents a null value
nonlocal	To declare a non-local variable
not	A logical operator
or	A logical operator
pass	A null statement, a statement that will do nothing
raise	To raise an exception
return	To exit a function and return a value
True	Boolean value, result of comparison operations
try	To make a try...except statement
while	To create a while loop
with	Used to simplify exception handling
yield	To end a function, returns a generator

Conventions in Python

* functions | variables

get_location_for_car()
tax amount

Snake Casing → one_two_three_four

* class

BankDetails

Pascal Casing → OneTwoThreeFour

MyPoint

String Functions

0 →

0 1 2 3 n s

[from,: to]

↓

k i n t k a t

zero

one

| →

1 2 3 4 5 6

based

based

-ve →

-6 -5 -4 -3 -2 -1

word[1:3]

Indentation

→ space

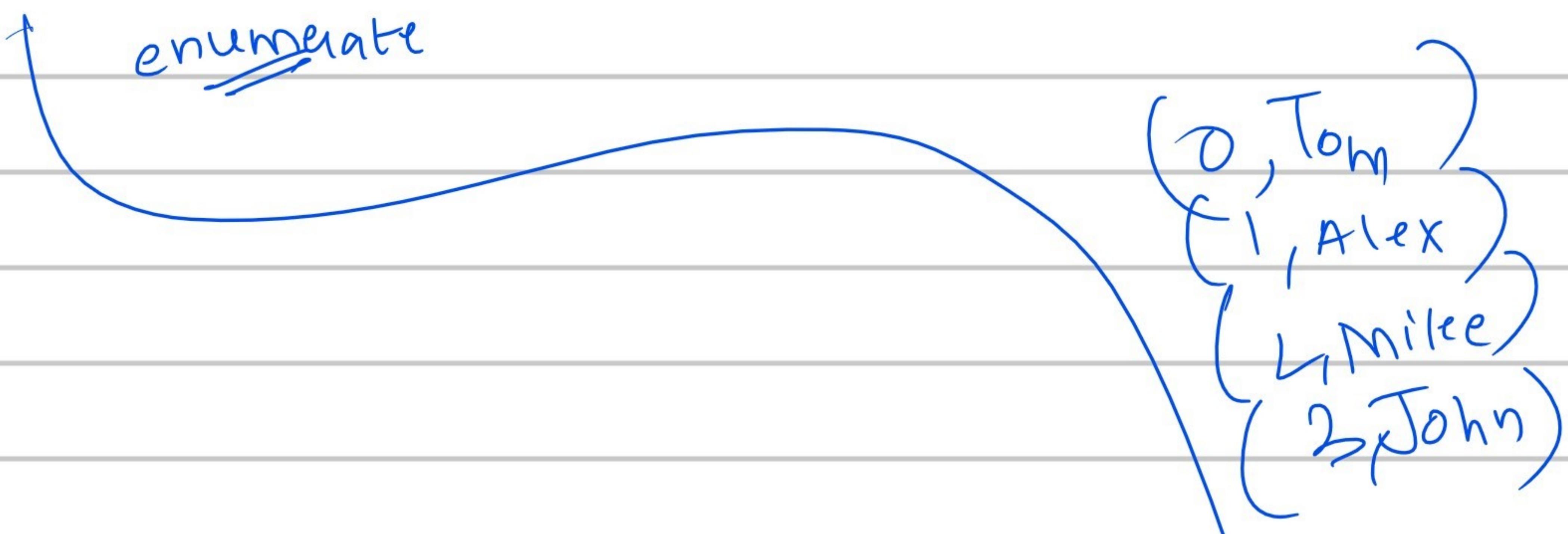
if condition :

 Statement(s)

else

 Statement(s)

 Statement(s)



String Interpolation

→ when we write a string without breaking
for including the
variables

$a = 10$

$b = 20$

"Value of a is " + a + ", and value of b is " + b

f" Value of a is {a}, value of b is {b};

group of related statements
which performs a specific task

Function

CODE ON DEMAND

def function_name (parameters):
 * * * * * ''' doc string '''
 statement(s)
 return someValue;

→ optional

Scope in Python

x → global

x - local

inside the
function

available throughout
the program

Python doesn't support block scope

Min scope it supports is
function

Data Structures



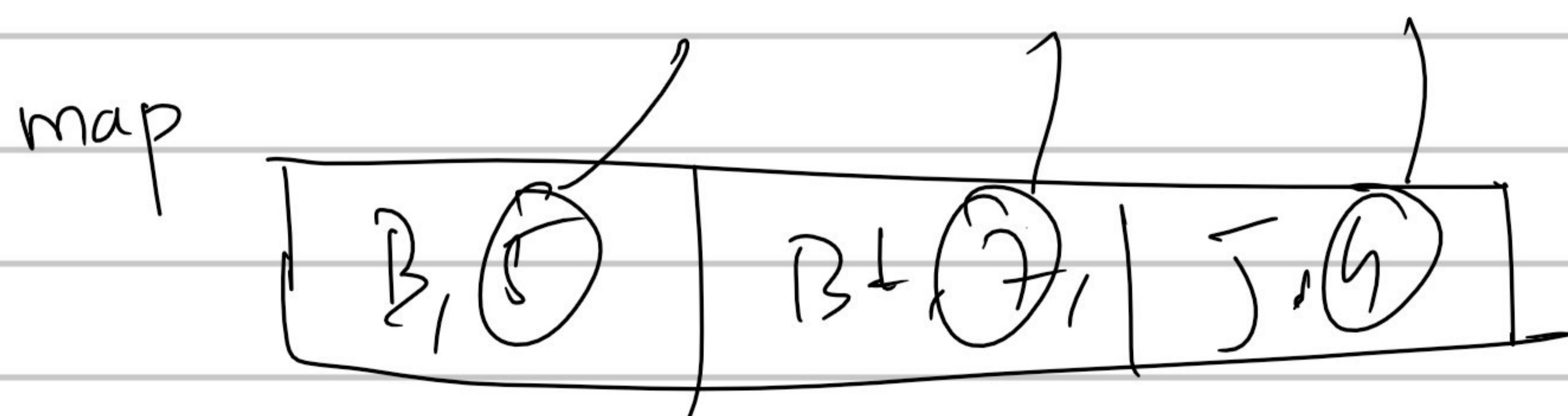
Lambda Function

anonymous functions → function without any name

Structure of a Lambda function

no return statement

lambda parameters: expression → executable
execute
value → returned



Exception Handling

unexpected erroneous event
~~occur~~ which breaks the
flow of the code.

try:

except Error:

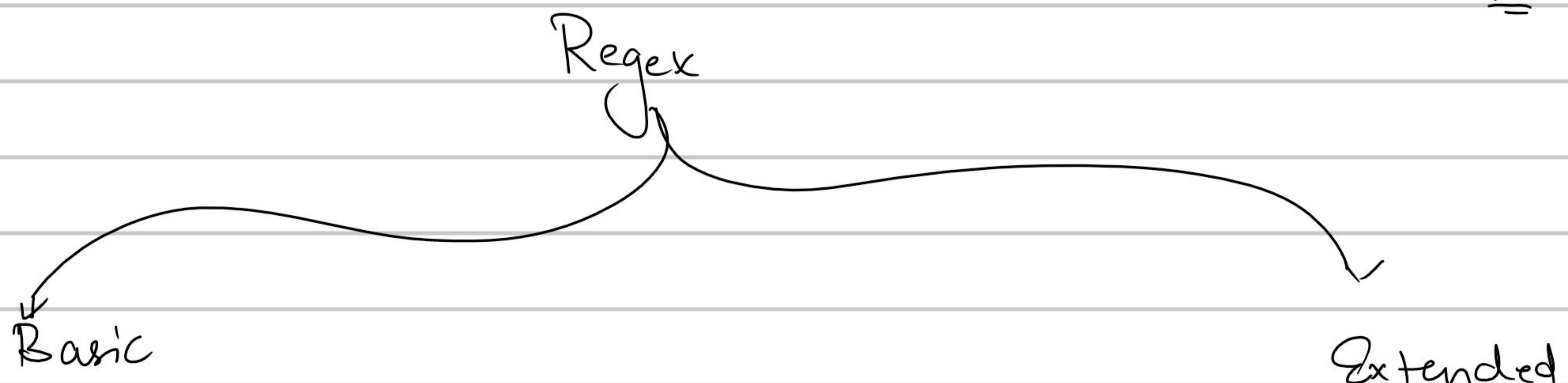
* Regex *

→ Regular Expression

Zartab @ codewithz.com ✓
zartab @ abc@ xyz.com ✗
zartab-h@gmail.com ✗

finding (matching) replacing
patterns in a string.

re



Symbol	What it represents?
*	Zero or more occurrences of the character that precedes this asterisk
.	A wild card that represents any character (alpha+numerical symbols)
\s	Represents whitespace
[pqr]	A single character which can be either a 'p', 'q' or an 'r'
[a-d]	A single character that falls in the range 'a-d' a, b, c, d
[^pq]	A single character that is neither 'p' nor 'q'
^pattern	^ is an anchor tag that represents the beginning of line
pattern\$	\$ is an anchor tag that represents the end of line

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

foaaaaabar

fooabar

foobar

fooaabar

fooxxxbar

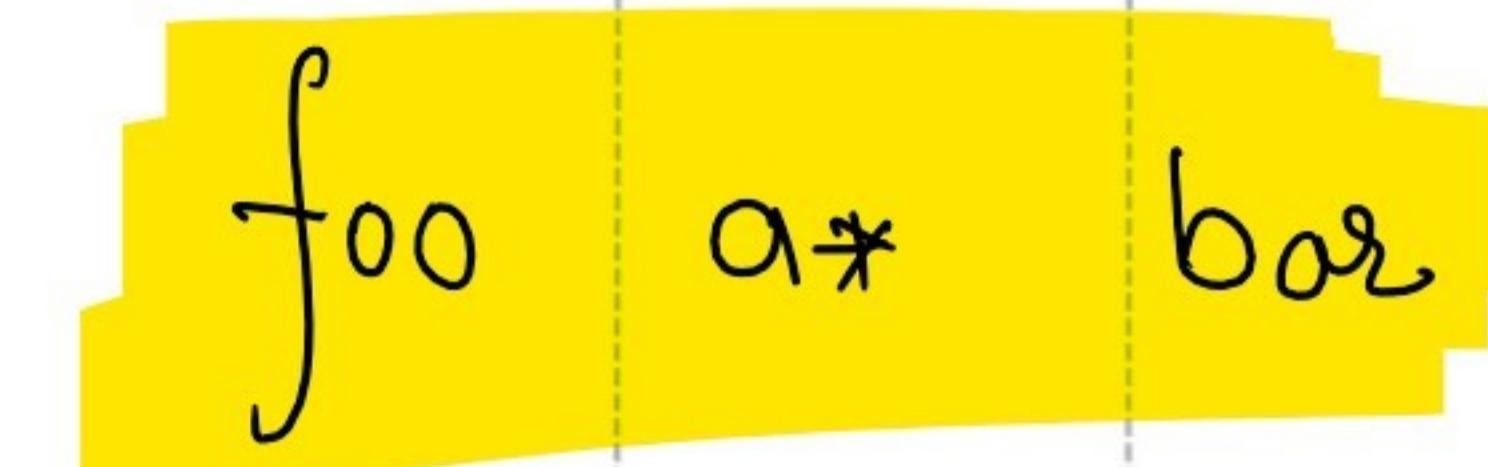
foobar

foo aaaa bar

foo a bar

foo bar

foo aa bar



a* - Zero or more occurrences o 'a' (The character just preceding the asterisk)

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

fooabar

foobar

baryfoo

foobar

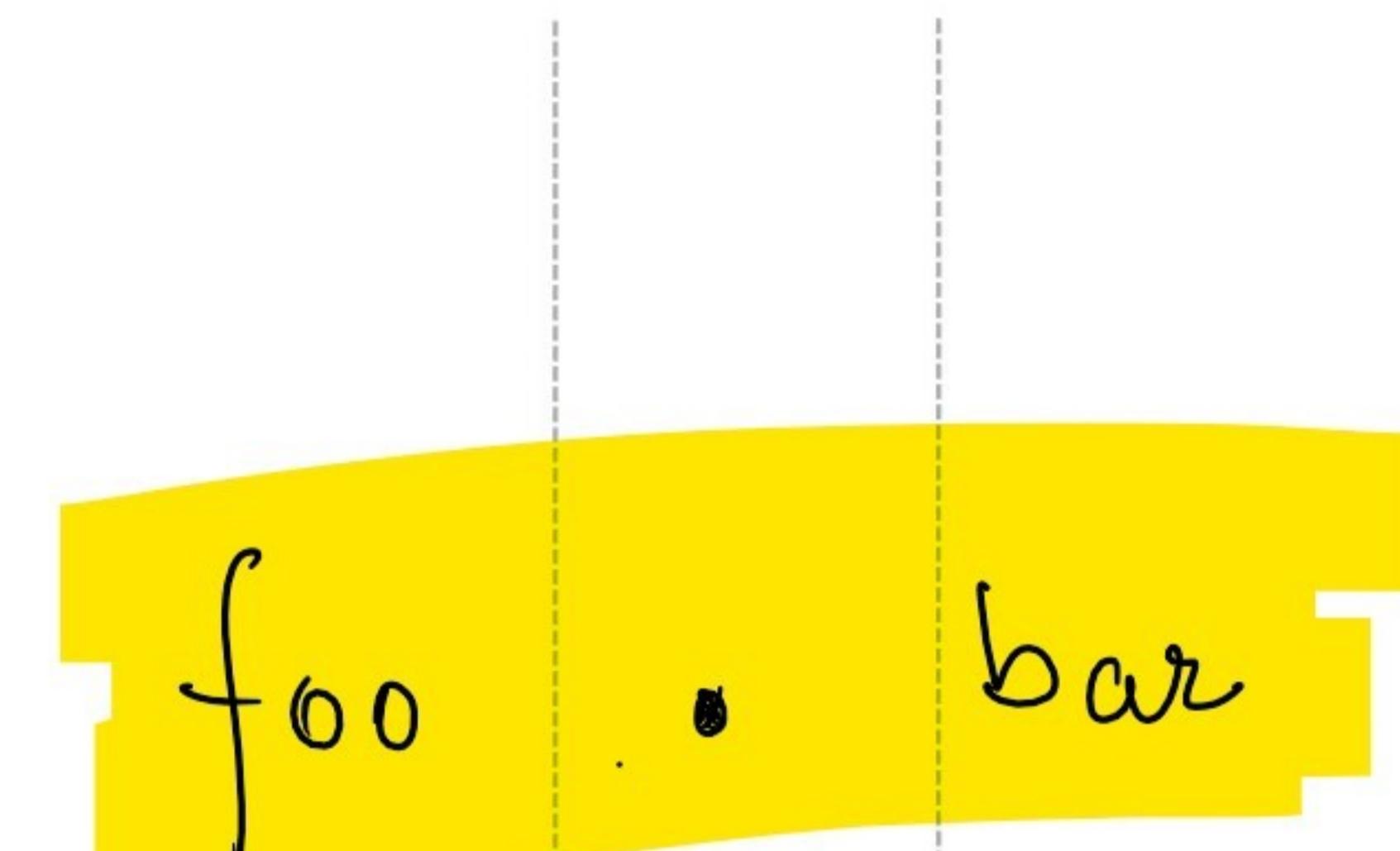
fooxybar

foocbar

foo a bar

foo x bar

foo c bar



. - Single wildcard . Can represent only ONE character [any] in single position

1

Understand the Requirement: What needs to be included or excluded

- foobar
- barfoo
- fooabcbar
- fooxcbar
- barcbyfoo
- foozbar
- barafoo
- barabfoo

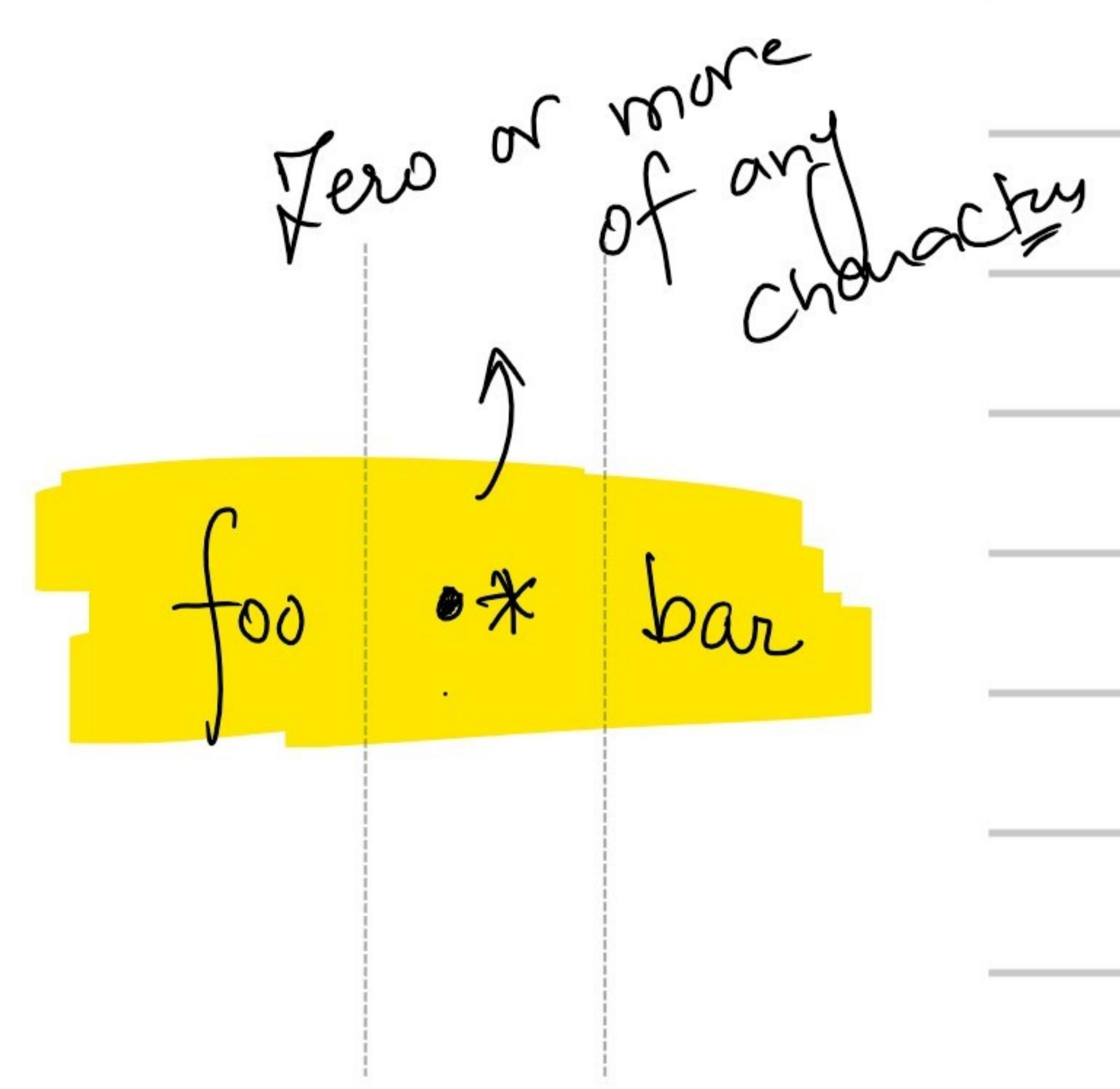
2

Identify the pattern in inclusion or exclusion list

<input checked="" type="checkbox"/> foo	bar
<input checked="" type="checkbox"/> foo	abc
<input checked="" type="checkbox"/> foo	xc
<input checked="" type="checkbox"/> foo	z

3

Final Regular Expression



.* - Zero or more occurrences of wildcard, which means zero or more occurrences of any character

1

Understand the Requirement: What needs to be included or excluded

- fooxxxbar
- foo bar
- fooxbar
- fooxxbbar
- foo bar
- foo bar
- foobar
- fooyyybar

2

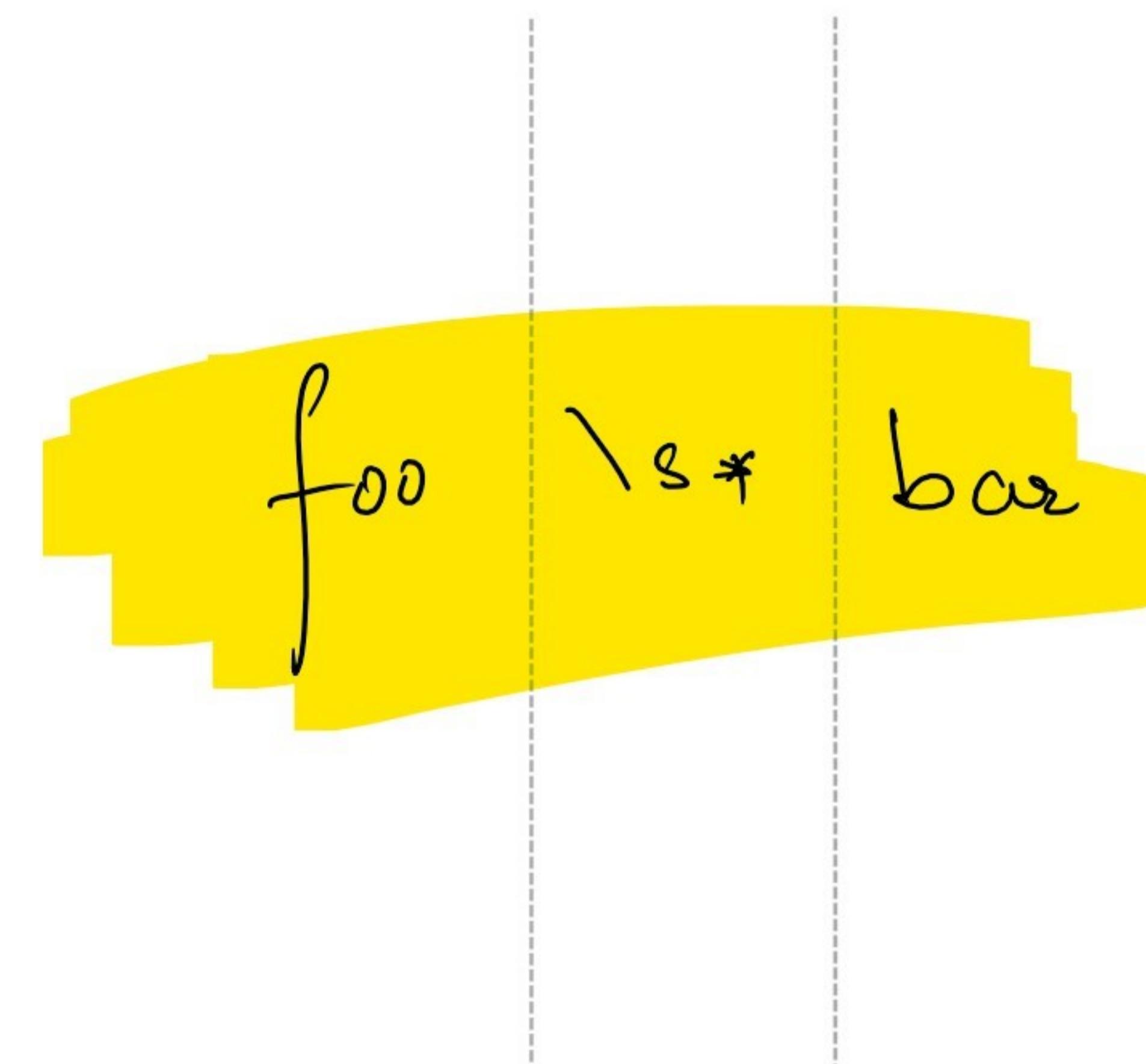
Identify the pattern in inclusion or exclusion list

<input checked="" type="checkbox"/> foo <3 spaces>	bar
<input checked="" type="checkbox"/> foo <1 spaces>	bar
<input checked="" type="checkbox"/> foo <6 spaces>	bar
<input checked="" type="checkbox"/> foo <0 spaces>	bar

3

Final Regular Expression

\s → space



\s represents whitespace. \s* represents zero or more occurrence of whitespace

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- foo
- moo
- coo
- doo
- poo
- loo
- boo
- hoo

f oo
 c oo
 l oo

either one of
three options

[fcl] oo

[abc] - Character class. One of the character inside the square brackets - a,b or c

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- foo
- moo
- coo
- doo
- poo
- loo
- boo
- hoo

m oo
 h oo

[fcplb] oo

[^mh] oo

[^abc] - Any character EXCEPT any of the one inside the square brackets, in a single

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- joo
- moo
- koo
- loo
- poo
- zoo
- moo
- hoo

<input checked="" type="checkbox"/> j	oo
<input checked="" type="checkbox"/> k	oo
<input checked="" type="checkbox"/> l	oo
<input checked="" type="checkbox"/> m	oo

$[jklm] \text{ oo}$

$[j-m] \text{ oo}$

[a-c] - One of the character falling in the range given in square brackets

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- joo
- moo
- koo
- loo
- poo
- moo
- zoo
- hoo

<input checked="" type="checkbox"/> j	oo
<input checked="" type="checkbox"/> k	oo
<input checked="" type="checkbox"/> l	oo
<input checked="" type="checkbox"/> m	oo
<input checked="" type="checkbox"/> z	oo

anything in j, k, l, m, z

$[j-k-z] \text{ oo}$

[a-cx] - One of the character falling in the range given in square brackets OR any of the other choices given in square brackets - a,b, c,x

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- joo
- moo
- Koo
- Loo
- poo
- moo
- zoo
- hoo

- j oo
- K oo
- L oo
- m oo
- z oo

anything in $j, k, l, m, J, K, L, M, z$

$[j-k-l-m-z]oo$

[a-cACx] - One of the character falling in the range given in square brackets OR any of the other choices given in square brackets - a,b, c,A,B,C,x

1

Understand the Requirement: What needs to be included or excluded

~~x y x~~
~~x y x x x~~
✓ ~~x x x . y y~~
✓ ~~x x . y y y y~~
✓ ~~x . y y~~
~~x x y~~
~~x x y y~~
~~y y x x~~

2

Identify the pattern in inclusion or exclusion list

xxx . yy
xx . yyyy
x . yy

3

Final Regular Expression

don't use it as a wildcard; use it as a period symbol

x* . y*

If a '.' is inside square brackets, it need not to be escaped

1

Understand the Requirement: What needs to be included or excluded

✓ x#y
✓ x:y
✓ x.y
~~x&y~~
~~x%y~~

2

Identify the pattern in inclusion or exclusion list

✓ x # y
✓ x : y
✓ x . y

3

Final Regular Expression

x [#: :] y

If a '.' is inside square brackets, it need not to be escaped

1

Understand the Requirement: What needs to be included or excluded

x#y

x:y

x^y

x&y

x%y

2

Identify the pattern in inclusion or exclusion list

x # y

x : y

x ^ y

3

Final Regular Expression

x [#:^] y

If a '^ - ' is inside square brackets, it need to be escaped with backslash

1

Understand the Requirement: What needs to be included or excluded

x#y

x\y

x^y

x&y

x%y

2

Identify the pattern in inclusion or exclusion list

x # y

x \ y

x ^ y

3

Final Regular Expression

x [\#\|\^\^] y

If a '\ ' is inside square brackets, it need to be escaped with another backslash

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

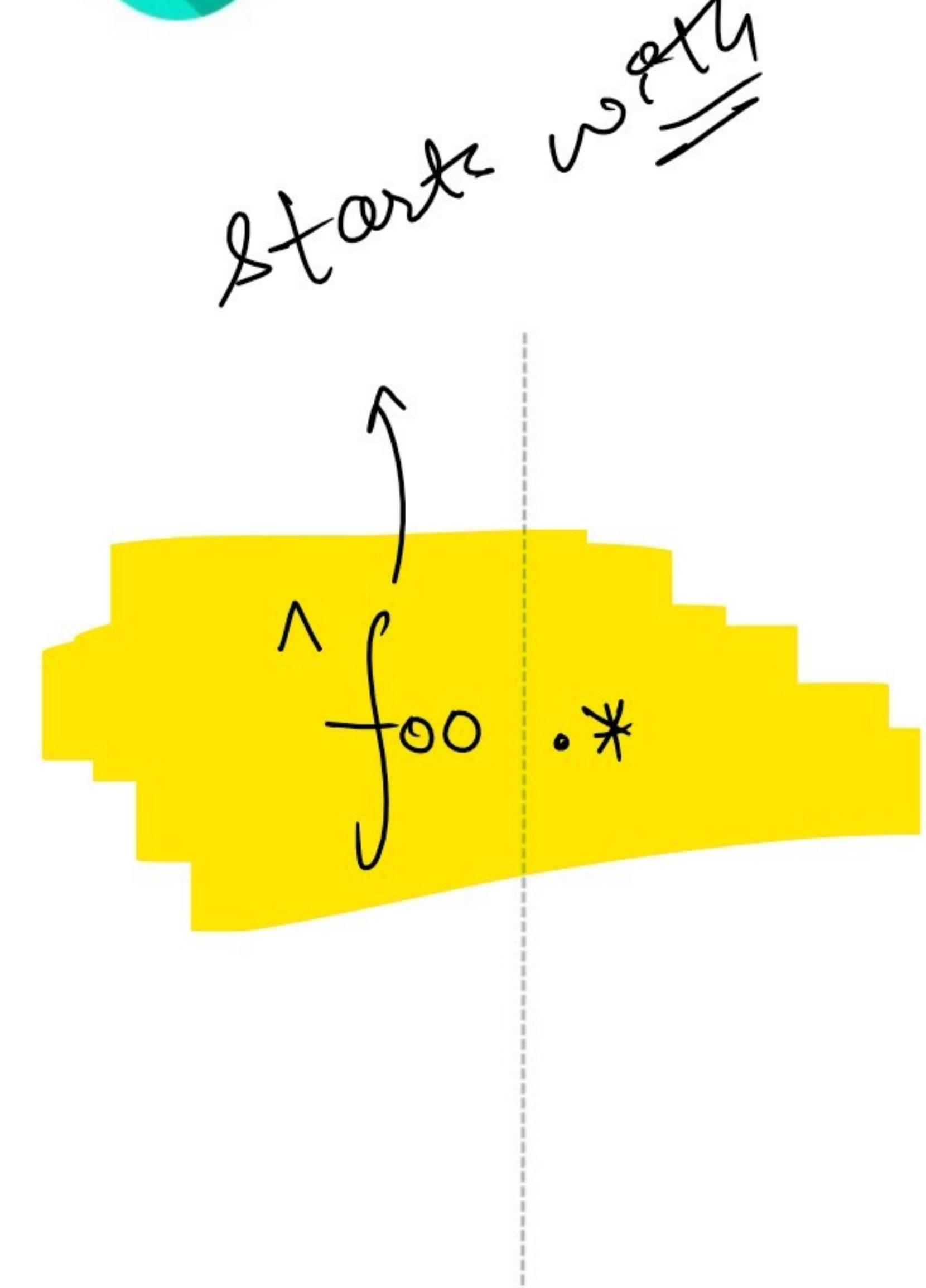
3

Final Regular Expression

- foo bar baz
- bar foo baz
- baz foo bar
- bar baz foo
- foo baz bar
- baz bar foo

foo bar baz

foo baz bar



^ is a placeholder that signifies beginning of line. Inside [] a ^ means negation, but outside brackets it acts as an anchor

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

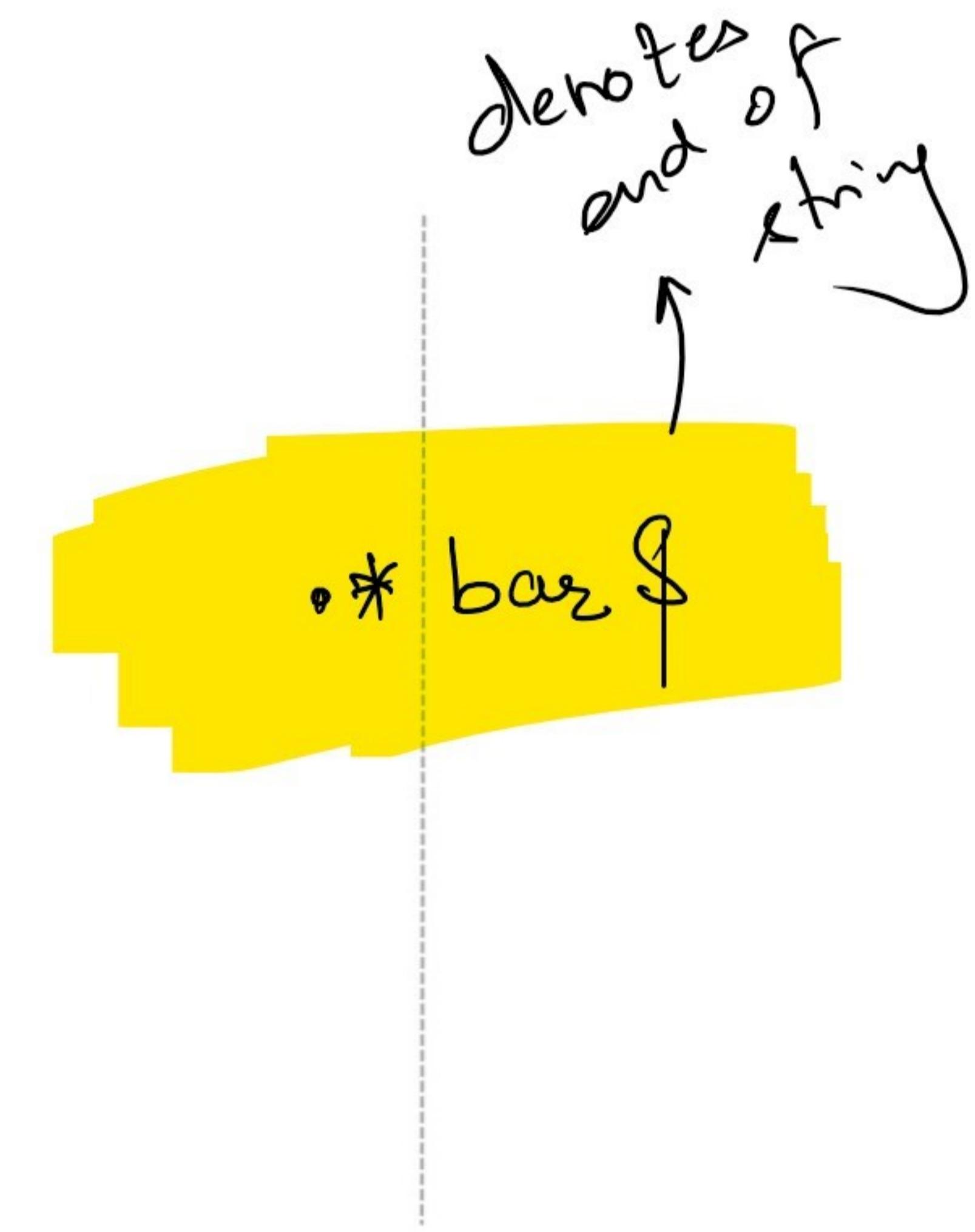
3

Final Regular Expression

- foo bar baz
- bar foo baz
- baz foo bar
- bar baz foo
- foo baz bar
- baz bar foo

baz foo bar

foo baz bar



\$ is a placeholder which signifies end of line

1

Understand the Requirement: What needs to be included or excluded

2

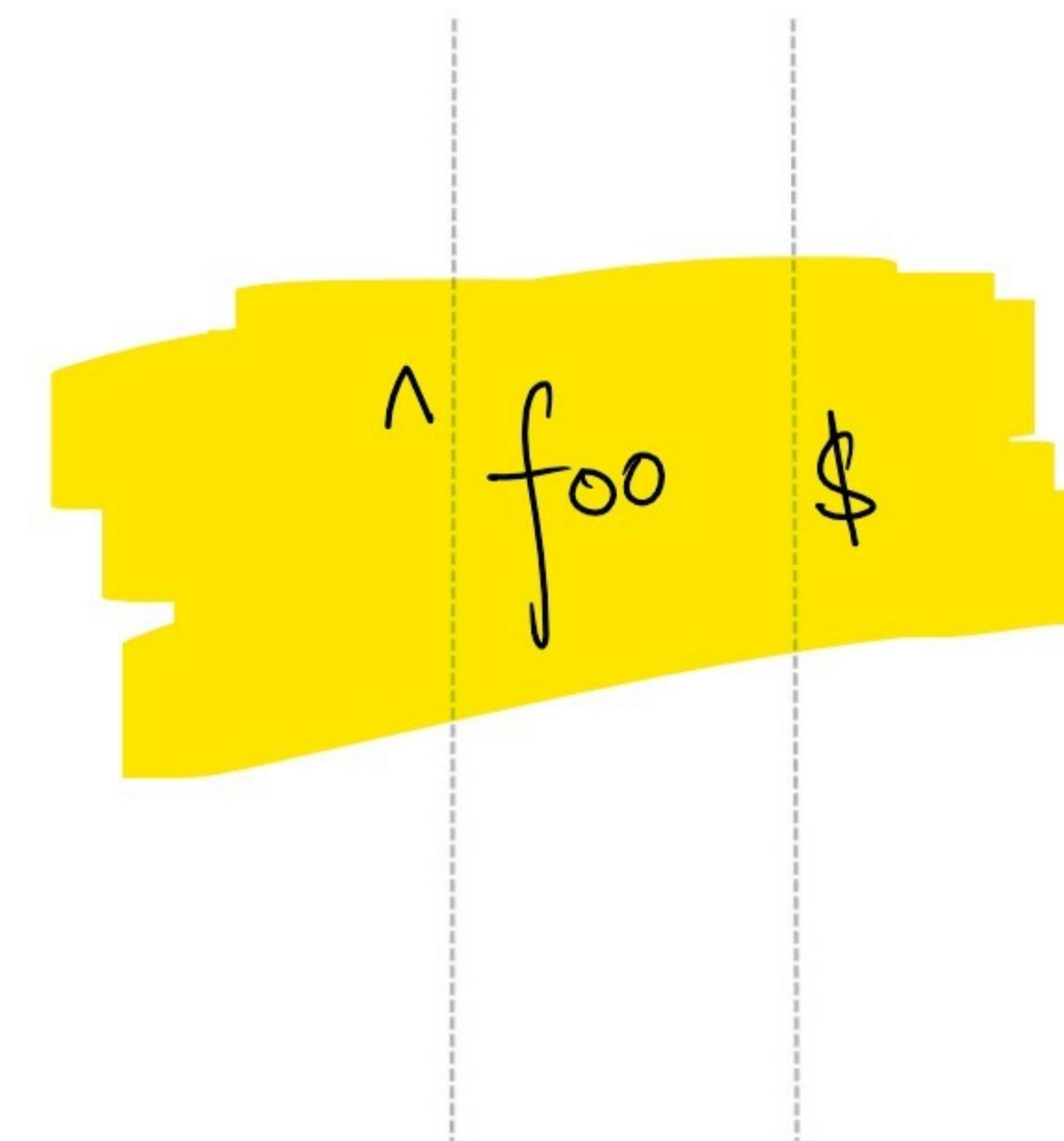
Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- foo
- bar foo
- baz foo
- bar baz foo
- foo baz bar
- baz bar foo

foo



^ signifies start of the line ; \$ is a placeholder which signifies end of line

Extended Set

Symbol	What it represents?
$^{+}$ ($1-n$)	One or more occurrences of the character that precedes + symbol
$^{?}$ ($0-1$)	Zero or one occurrence of the character that precedes ? symbol
pat ₁ pat ₂	Match either the pattern pat1 or pattern pat2
()	Divides the pattern into groups
{m}	Exactly 'm' occurrences of whatever precedes
{m,n}	At least m and at most n occurrences of whatever precedes

1

Understand the Requirement: What needs to be included or excluded

- 834
- 519
- 4874
- 5
- 89
- 45687
- 25
- 645

2

Identify the pattern in inclusion or exclusion list

<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	[0-9][0-9][0-9]	\$
	<input checked="" type="checkbox"/>	[0-9][0-9][0-9]	\$
	<input checked="" type="checkbox"/>	[0-9][0-9][0-9]	\$

3

Final Regular Expression

$^{\wedge} [0-9]\{3\} \$$

$a\{m\}$ represents exactly 'm' repetitions of whatever immediately precedes this

1

Understand the Requirement: What needs to be included or excluded

- lion
- tiger
- leopard ↗
- fox ~3
- kangaroo ↘
- cat ~3
- mouse
- cuckoo
- deer

2

Identify the pattern in inclusion or exclusion list

<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	[a-z]{4}	\$
	<input checked="" type="checkbox"/>	[a-z]{5}	\$
	<input checked="" type="checkbox"/>	[a-z]{5}	\$
	<input checked="" type="checkbox"/>	[a-z]{6}	\$

3

Final Regular Expression

min max

$^{\wedge} [a-z]\{4, 6\} \$$

$a\{m,n\}$ represents atleast 'm' and atmost 'n' repetitions of whatever immediately precedes this

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- ha
- hahahahaha
- hahaha
- hahahaha
- haha
- hahahahaha
- hahahahahahaha
- hahahahahahahaha

- ha{5}
- ha{4}
- ha{6}
- ha{8}
- ha{9}

 $(ha)^{4\{}$

paranthesis is used for grouping and treating as a single entity
 $\{m,\}$ represents atleast m repetitions of whatever precedes

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- fooaaaabar
- fooabar
- foobar
- fooxxxbar
- foobar

<input checked="" type="checkbox"/> foo	aaaa	bar
<input checked="" type="checkbox"/> foo	a	bar
<input checked="" type="checkbox"/> foo	aa	bar



a+ One or more occurrences of 'a'

1

Understand the Requirement: What needs to be included or excluded

- https://website
- http://website
- httpss://website
- httpx://website
- httpxx://website

2

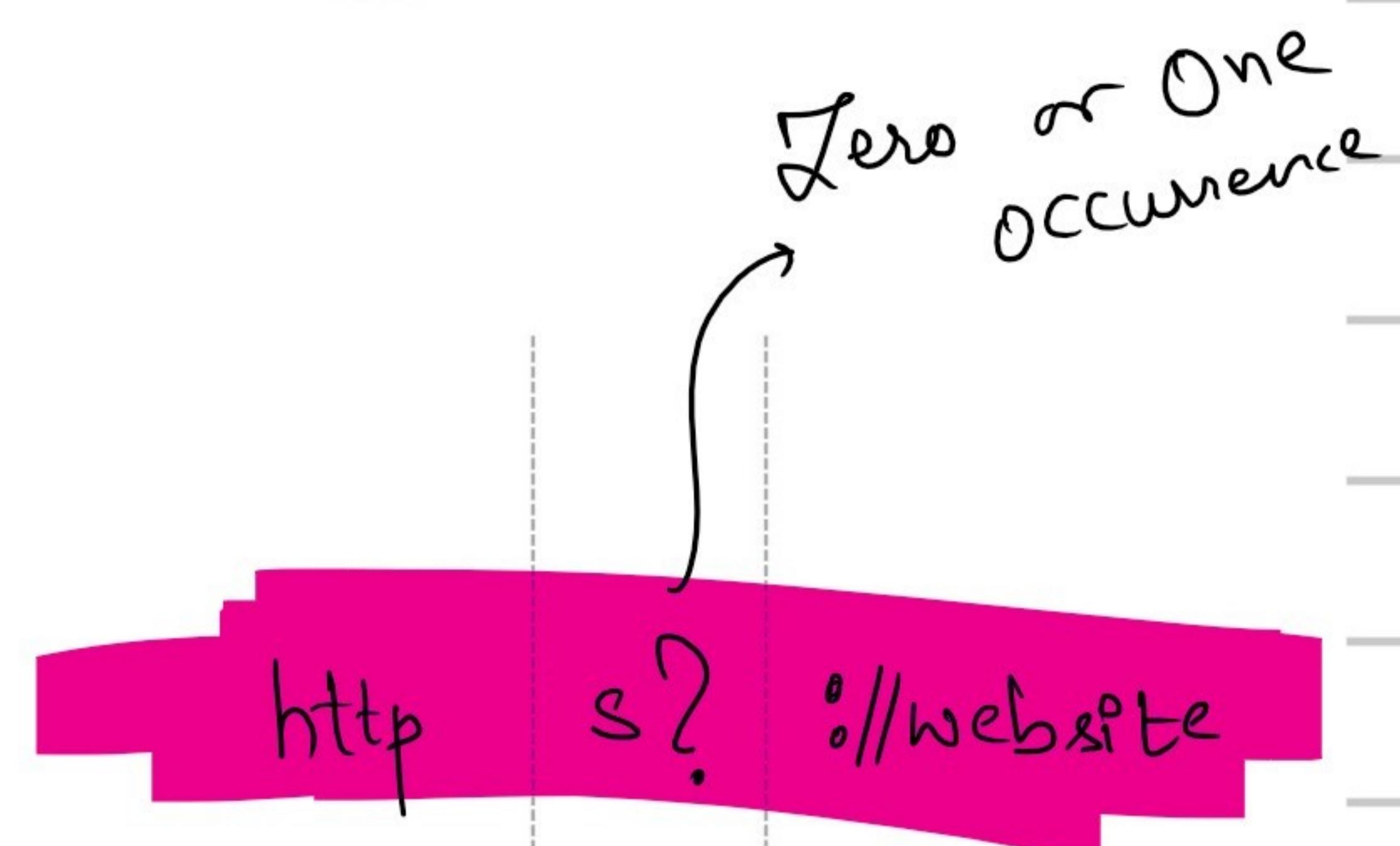
Identify the pattern in inclusion or exclusion list

http s ://website

http ://website

3

Final Regular Expression



a? Zero or One occurrence of 'a'

1

Understand the Requirement: What needs to be included or excluded

- redwood
- logwood
- sapwood
- rosewood
- plywood
- teakwood

2

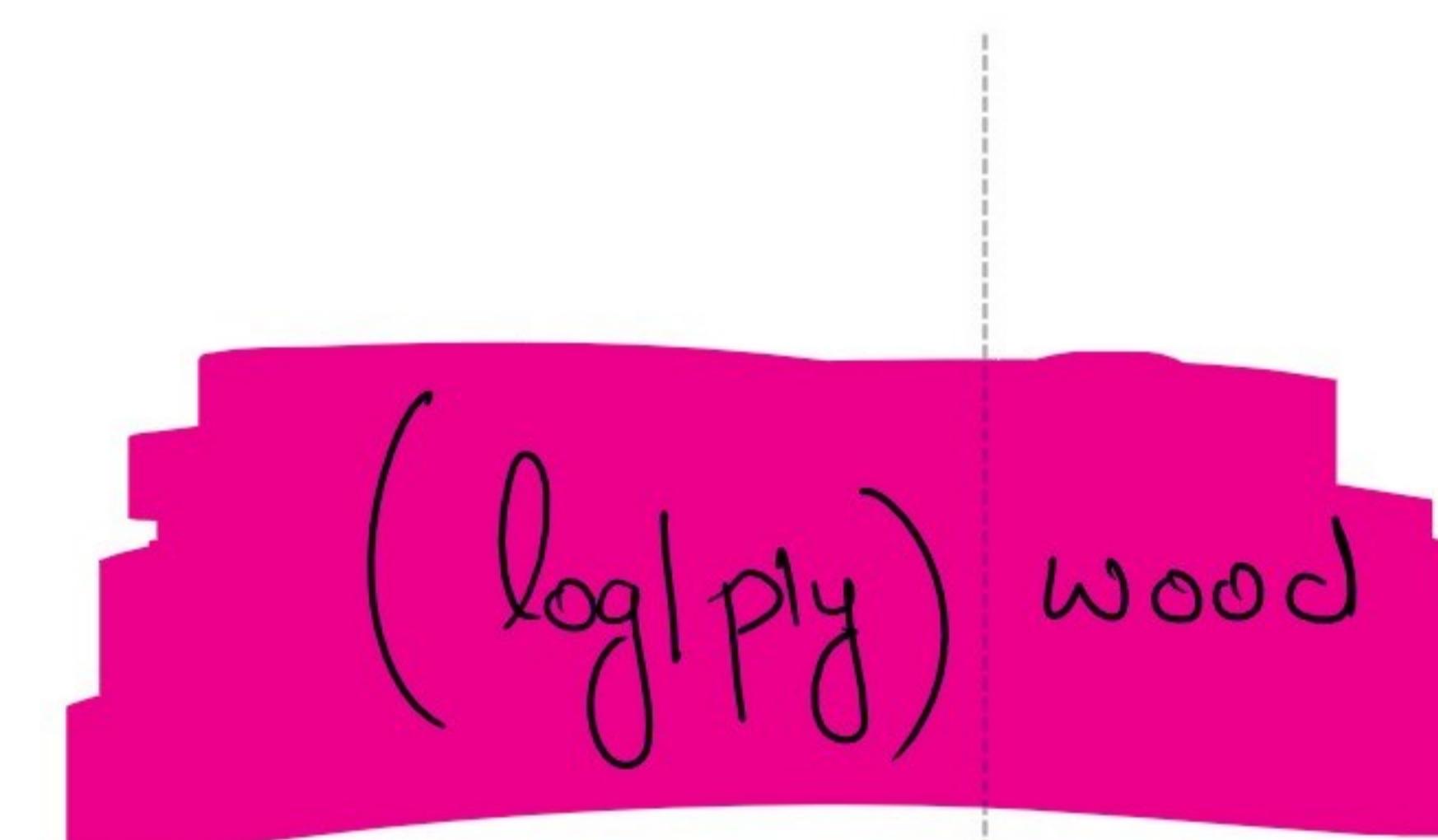
Identify the pattern in inclusion or exclusion list

log wood

ply wood

3

Final Regular Expression



(a|b) represents either a or b, where a and b can be multi character strings

\A - Matches if the specified characters are at the start of a string.

Expression	String	Matched?
\Athe	the sun	Match
\Athe	In the sun	No match

\Z - Matches if the specified characters are at the end of a string.

Expression	String	Matched?
	I like Python	1 match
Python\Z	I like Python Programming	No match
	Python is fun.	No match

\b - Matches if the specified characters are at the beginning or end of a word.

Expression	String	Matched?
	football	Match
\bfoo	a football	Match
	afootball	No match
	the foo	Match
foo\b	the afoo test	Match

\B - Opposite of \b . Matches if the specified characters are **not** at the beginning or end of a word.

Expression	String	Matched?
	football	No match
\Bfoo	a football	No match
	afootball	Match
	the foo	No match
foo\B	the afoo test	No match
	the afootest	Match

\d - Matches any decimal digit. Equivalent to [0-9]

Expression	String	Matched?
\d	12abc3	3 matches (at 12abc3)
	Python	No match

\D - Matches any non-decimal digit. Equivalent to [^0-9]

Expression	String	Matched?
\D	1ab34"50	3 matches (at 1ab34"50)
	1345	No match

`\s` - Matches where a string contains any whitespace character. Equivalent to `[\t\n\r\f\v]`.

Expression	String	Matched?
<code>\s</code>	Python RegEx	1 match
<code>\s</code>	PythonRegEx	No match

`\S` - Matches where a string contains any non-whitespace character. Equivalent to `[^ \t\n\r\f\v]`.

Expression	String	Matched?
<code>\S</code>	a b	2 matches (at <code>a</code> <code>b</code>)
<code>\S</code>		No match

`\w` - Matches any alphanumeric character (digits and alphabets). Equivalent to `[a-zA-Z0-9_]`. By the way, underscore `_` is also considered an alphanumeric character.

Expression	String	Matched?
<code>\w</code>	12&" : ;c	3 matches (at <code>12&" : ;c</code>)
<code>\w</code>	%" > !	No match

`\W` - Matches any non-alphanumeric character. Equivalent to `[^a-zA-Z0-9_]`

Expression	String	Matched?
<code>\W</code>	1a2%c	1 match (at <code>1a2%c</code>)
<code>\W</code>	Python	No match

Email Pattern

1. It should have one `@` symbol in between
2. Before `@` it can be any number of a-z,A-Z, `_`,
3. After `@` there should be minimum one number of a-z,A-Z,0-9,-
4. After `@` and previous combination there should be minimum one period(.) sign
5. It should end with either com,org or net

Indian Mobile Number Pattern

1. It should have 10 numbers
2. Starting number should be either 7,8, or 9

Email Pattern

1. It should have one @ symbol in between
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Indian Mobile Number Pattern

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2. Starting number should be either 7,8, or 9

Email Pattern

$^{\wedge} [A-Za-z] [A-Za-z0-9_+] + @ [A-Za-z] [A-Za-z0-9_+] + \cdot (\text{com} | \text{org} | \text{net})$

Indian Mobile Number Pattern

$[0-9] \{10\}$

$[7-9] \{1\} [0-9] \{9\}$

Object Orientation

Everything in Python

is an Object

```
numbers = [1, 2, 3]  
print(type(numbers))
```

numbers[1]

numbers.append(4); ✓

numbers.swim(); ✗

<class 'list'>

→ blueprint of what all things
a variable which belongs to
the class list can do

→ because swim() is not defined
inside class list

point

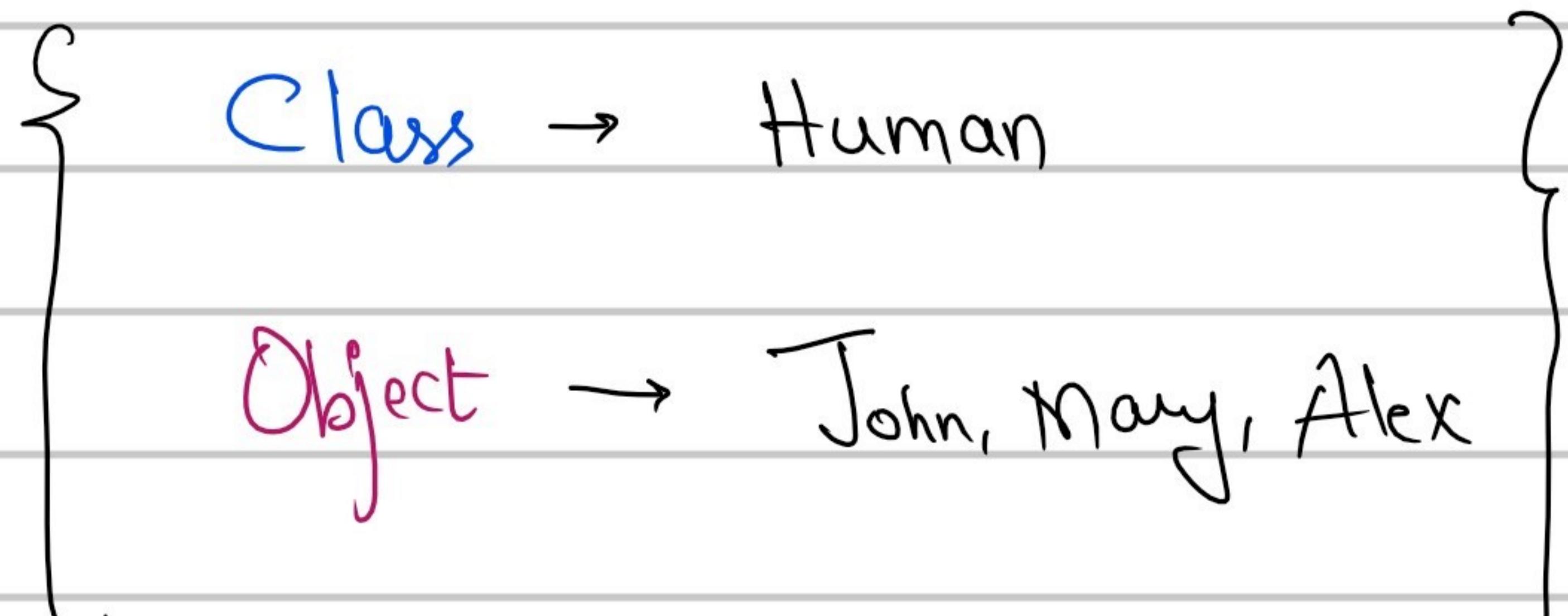
- draw()
- move()
- get_distance()

shopping_cart

- add()
- remove()
- get_price(product)

Class → template or a blueprint which is used to describe an object

Object → instance of a class



```

class Point:
    def draw(self):
        print("Something")

```

Variables of an object are assigned to `self`
 not a keyword
`self` reference to the current object.
 It is compulsory to write a self referencing object to be first parameter in any function.

* Decorators *

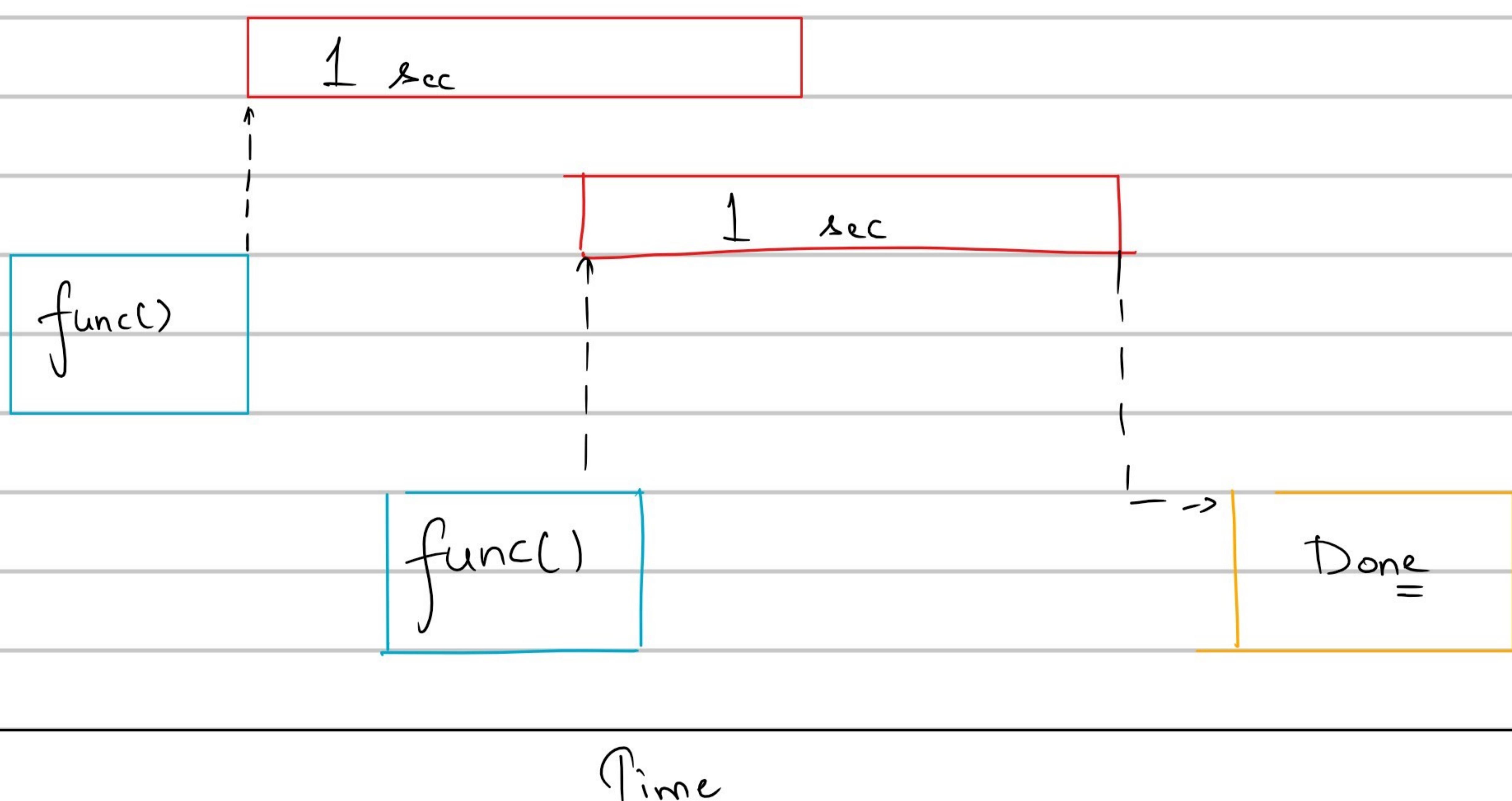
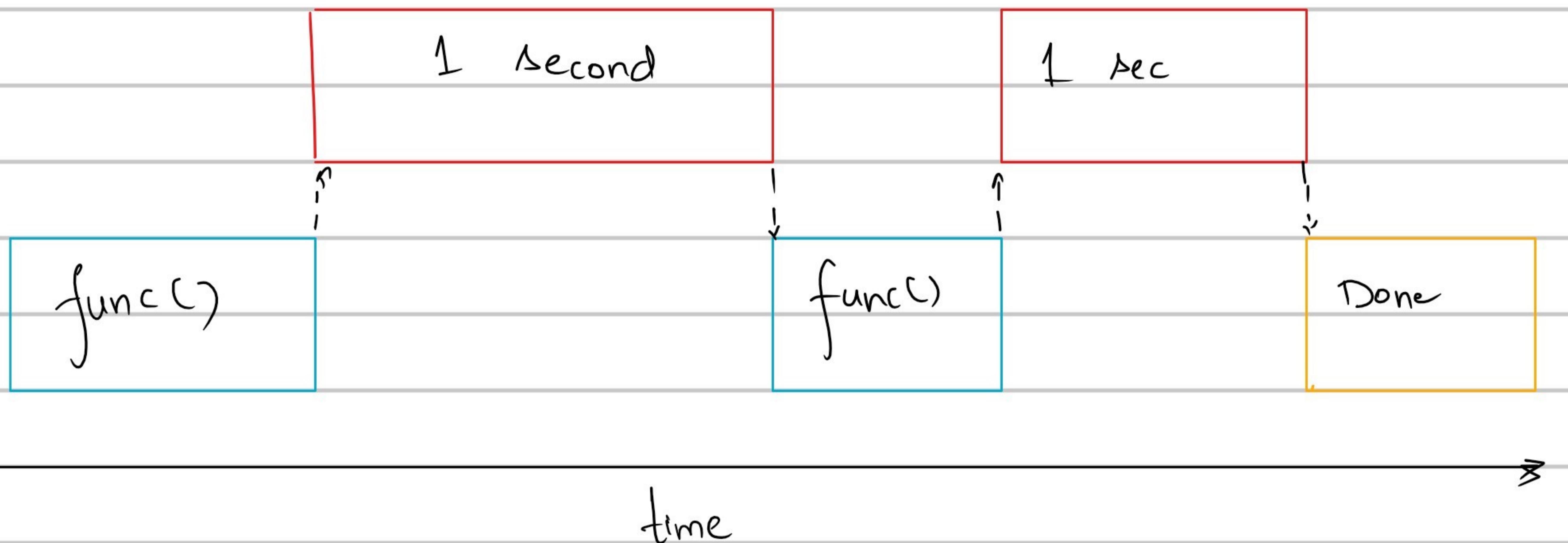
A decorator takes in a function, add some functionality &

returns it

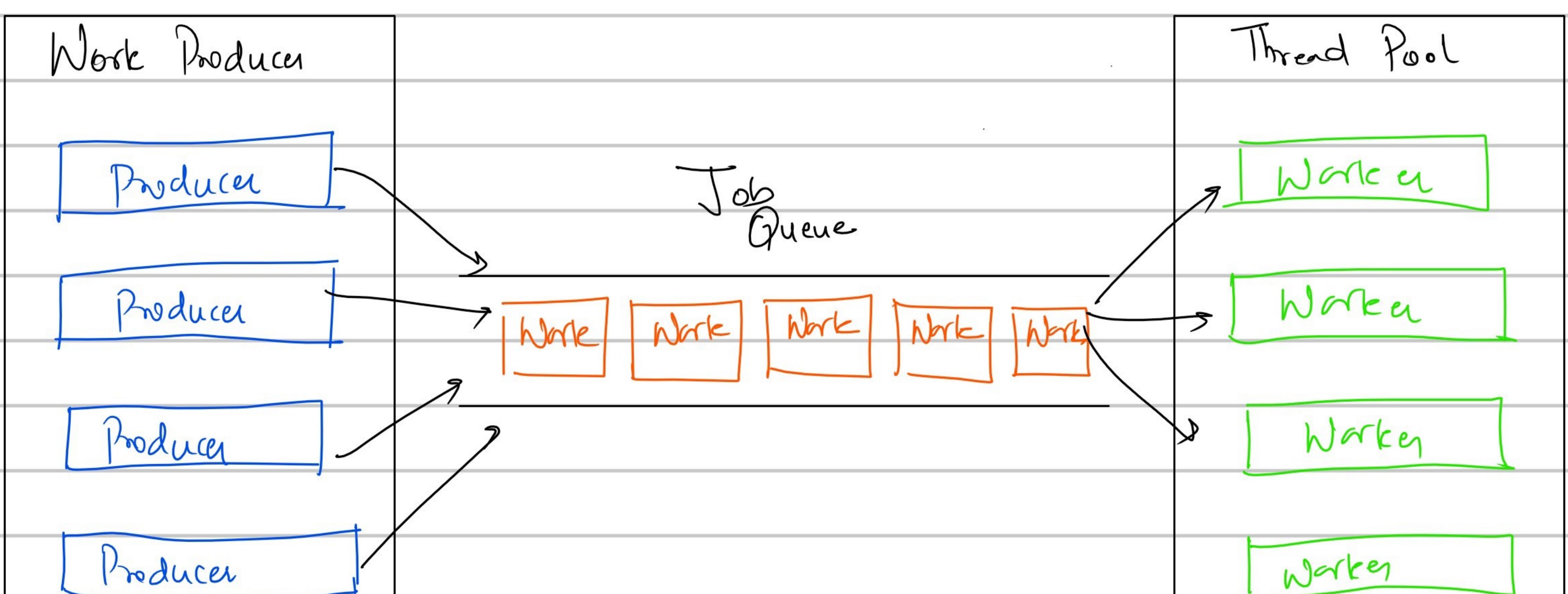
Metaprogramming

a part of a program tries to modify another part of a program at compile time

Synchronous



Thread Pool



ThreadPoolExecutor

