VACATION CLASS

ALGORITHM AND DATA STRUCTURE

Week 2

11 September 2025

YEM DARO

COLLECTION

- Data types used to store and organize multiple items

COLLECTION

- Data types used to store and organize multiple items
  - Array / List
  - Tuple
  - Map / Dictionary
  - Set

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MASTER YOUR FUNDAMENTALS!

COLLECTION

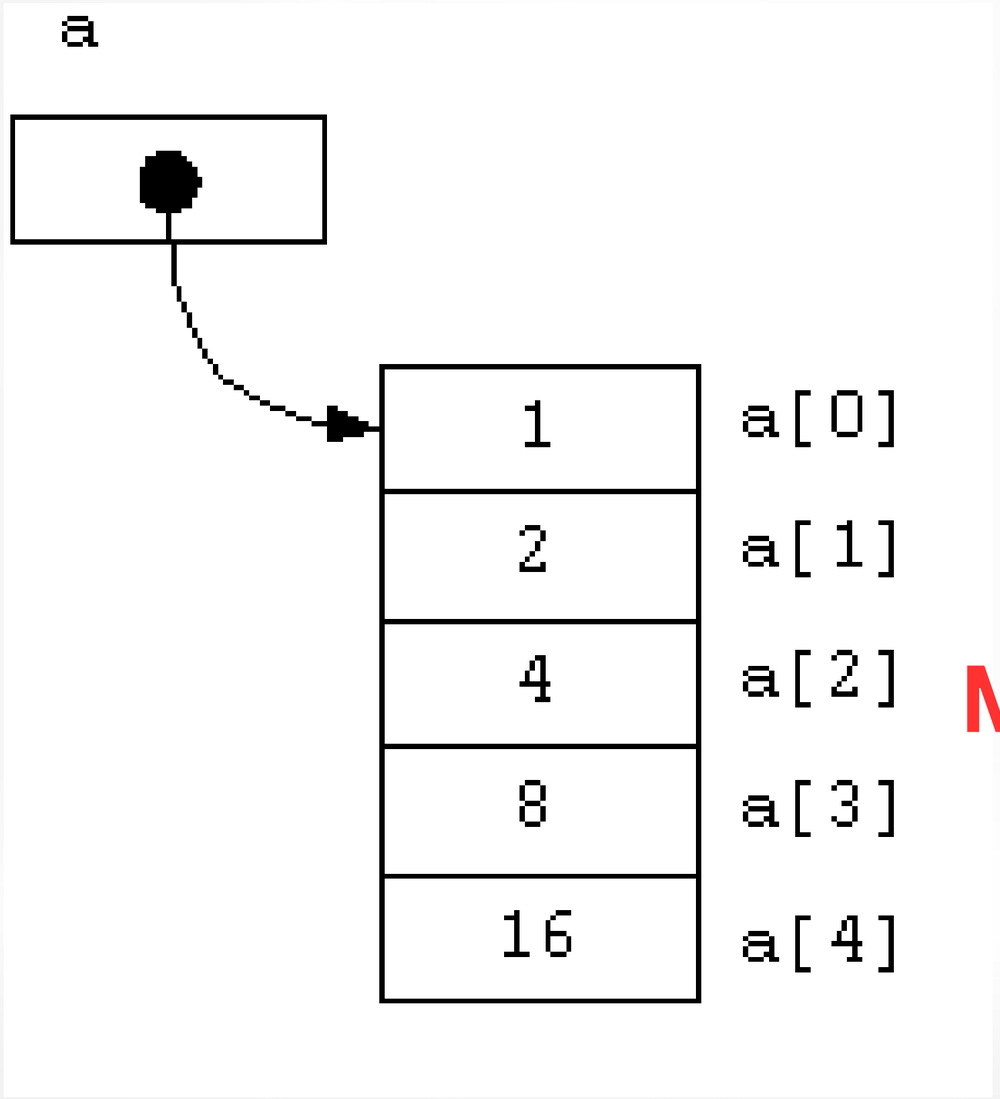
- Data types used to store and organize multiple items
  - Queue
  - Stack
  - Deque
  - Tree

PUSH YOUR LIMIT

DIG DEEPER

COLLECTION
ARRAY

Variable / Pointer



Memory Address
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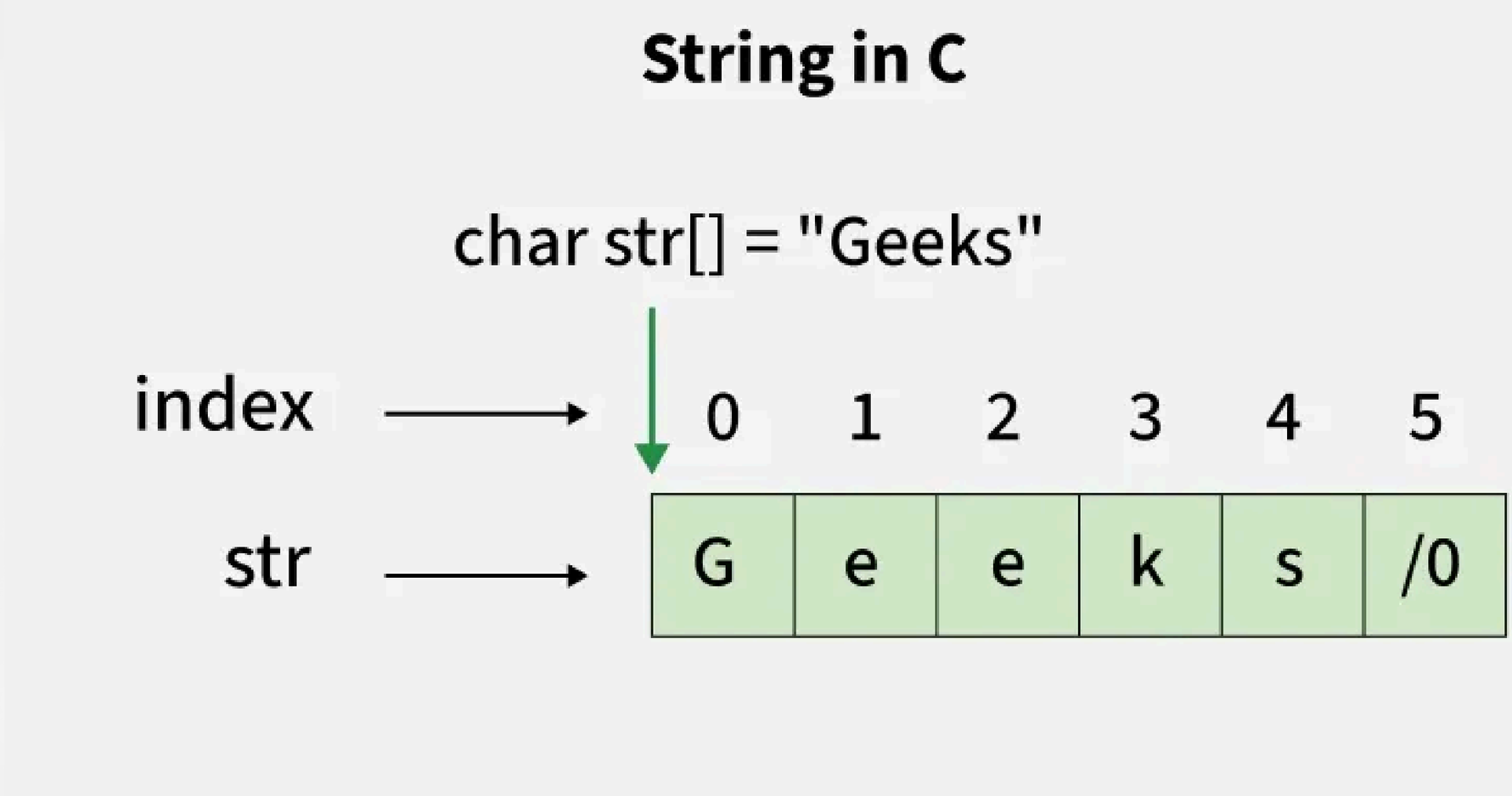
COLLECTION

ARRAY



STRINGS AND SLICES

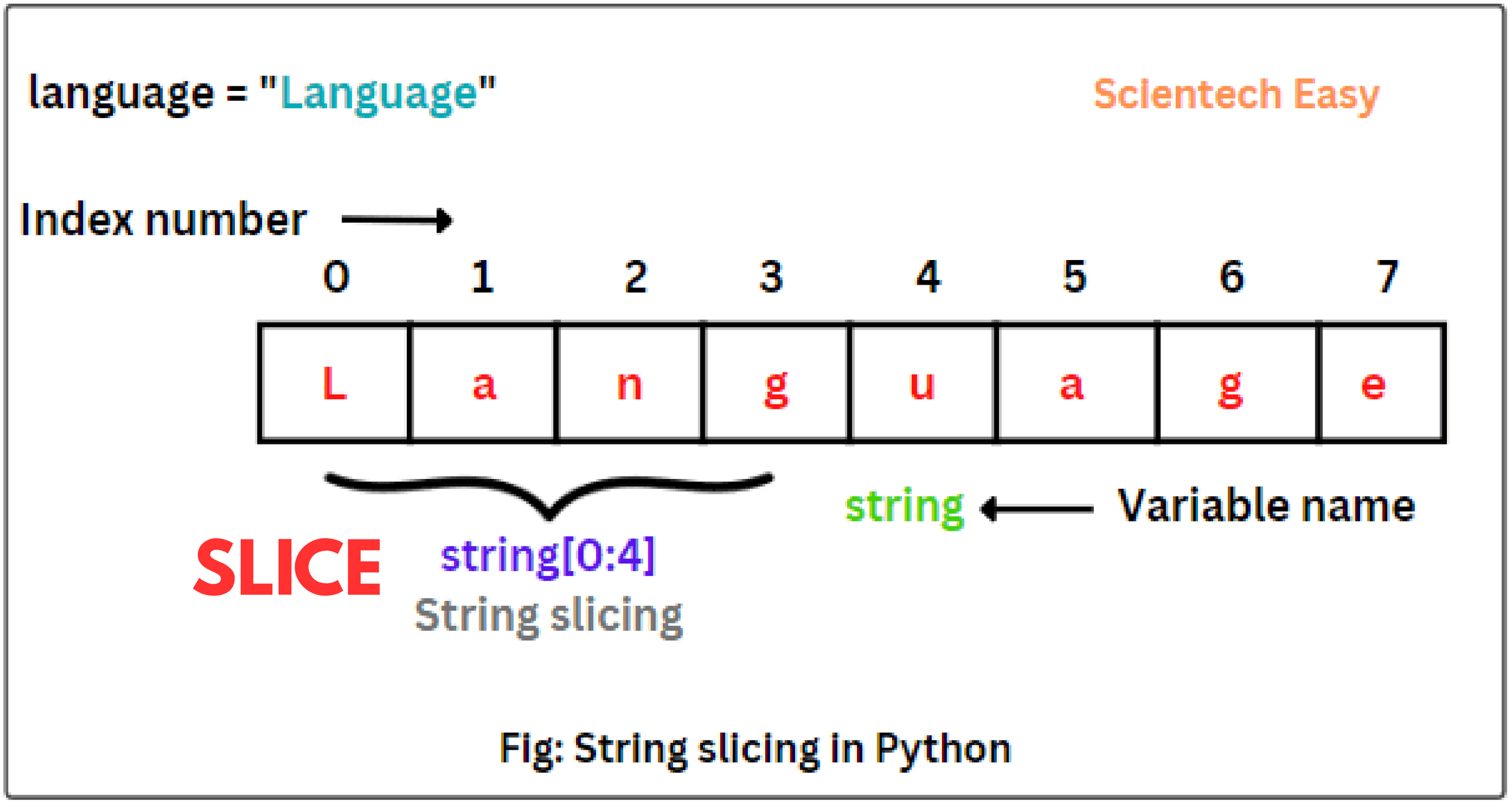


Fig: String slicing in Python

STRINGS AND LOOPS

- these two code snippets do the same thing
- bottom one is more “pythonic”

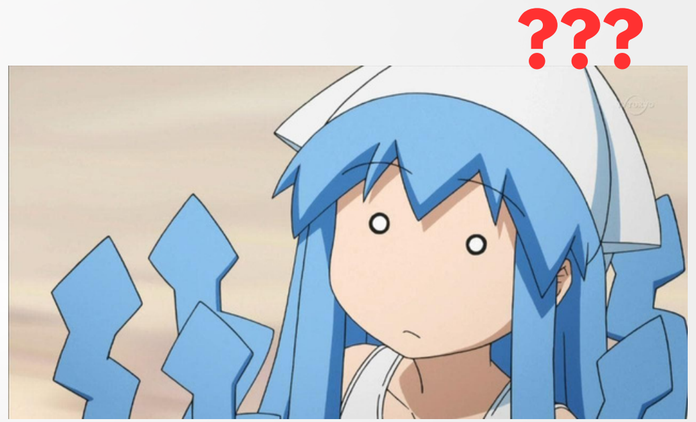
```
s = "abcdefgh"
for index in range(len(s)):
    if s[index] == 'i' or s[index] == 'u':
        print("There is an i or u")

for char in s:
    if char == 'i' or char == 'u':
        print("There is an i or u")
```

API

Application Programming Interface

A set of rules and tools that allows different software systems to communicate with each other.



API

In Web Development

API is a simple way for us to access network resource

```
curl -i -X GET \
  "https://graph.facebook.com/USER-ID?fields=id,name,email,picture&access_token=ACCESS-TOKEN"
```

Data Returned

```
{
  "id": "USER-ID",
  "name": "EXAMPLE NAME",
  "email": "EXAMPLE@EMAIL.COM",
  "picture": {
    "data": {
      "height": 50,
      "is_silhouette": false,
      "url": "URL-FOR-USER-PROFILE-PICTURE",
      "width": 50
    }
  }
}
```

API

API can also refers to functions that a Language, Library or Framework allow us to use

Python:

len, range

sort, all, any

map, filter, reduce

EXERCISE

CAESAR CIPHER

caesar_cipher(a, 3)

→ d

caesar_cipher(d, -3)

→ a

caesar_cipher(Z, 2)

→ b

ASCII TABLE

Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char
0	0	[NULL]	32	20	[SPACE]	64	40	@	96	60	`
1	1	[START OF HEADING]	33	21	!	65	41	A	97	61	a
2	2	[START OF TEXT]	34	22	"	66	42	B	98	62	b
3	3	[END OF TEXT]	35	23	#	67	43	C	99	63	c
4	4	[END OF TRANSMISSION]	36	24	$	68	44	D	100	64	d
5	5	[ENQUIRY]	37	25	%	69	45	E	101	65	e
6	6	[ACKNOWLEDGE]	38	26	&	70	46	F	102	66	f
7	7	[BELL]	39	27	'	71	47	G	103	67	g
8	8	[BACKSPACE]	40	28	(	72	48	H	104	68	h
9	9	[HORIZONTAL TAB]	41	29	)	73	49	I	105	69	i
10	A	[LINE FEED]	42	2A	*	74	4A	J	106	6A	j
11	B	[VERTICAL TAB]	43	2B	+	75	4B	K	107	6B	k
12	C	[FORM FEED]	44	2C	,	76	4C	L	108	6C	l
13	D	[CARRIAGE RETURN]	45	2D	-	77	4D	M	109	6D	m
14	E	[SHIFT OUT]	46	2E	.	78	4E	N	110	6E	n
15	F	[SHIFT IN]	47	2F	/	79	4F	O	111	6F	o
16	10	[DATA LINK ESCAPE]	48	30	0	80	50	P	112	70	p
17	11	[DEVICE CONTROL 1]	49	31	1	81	51	Q	113	71	q
18	12	[DEVICE CONTROL 2]	50	32	2	82	52	R	114	72	r
19	13	[DEVICE CONTROL 3]	51	33	3	83	53	S	115	73	s
20	14	[DEVICE CONTROL 4]	52	34	4	84	54	T	116	74	t
21	15	[NEGATIVE ACKNOWLEDGE]	53	35	5	85	55	U	117	75	u
22	16	[SYNCHRONOUS IDLE]	54	36	6	86	56	V	118	76	v
23	17	[END OF TRANS. BLOCK]	55	37	7	87	57	W	119	77	w
24	18	[CANCEL]	56	38	8	88	58	X	120	78	x
25	19	[END OF MEDIUM]	57	39	9	89	59	Y	121	79	y
26	1A	[SUBSTITUTE]	58	3A	:	90	5A	Z	122	7A	z
27	1B	[ESCAPE]	59	3B	;	91	5B	[	123	7B	{
28	1C	[FILE SEPARATOR]	60	3C	<	92	5C	\	124	7C	|
29	1D	[GROUP SEPARATOR]	61	3D	=	93	5D	]	125	7D	}
30	1E	[RECORD SEPARATOR]	62	3E	>	94	5E	^	126	7E	~
31	1F	[UNIT SEPARATOR]	63	3F	?	95	5F	_	127	7F	[DEL]

PYTHON VIRTUAL ENVIRONMENT

- python -m venv venv
- venv\Scripts\activate

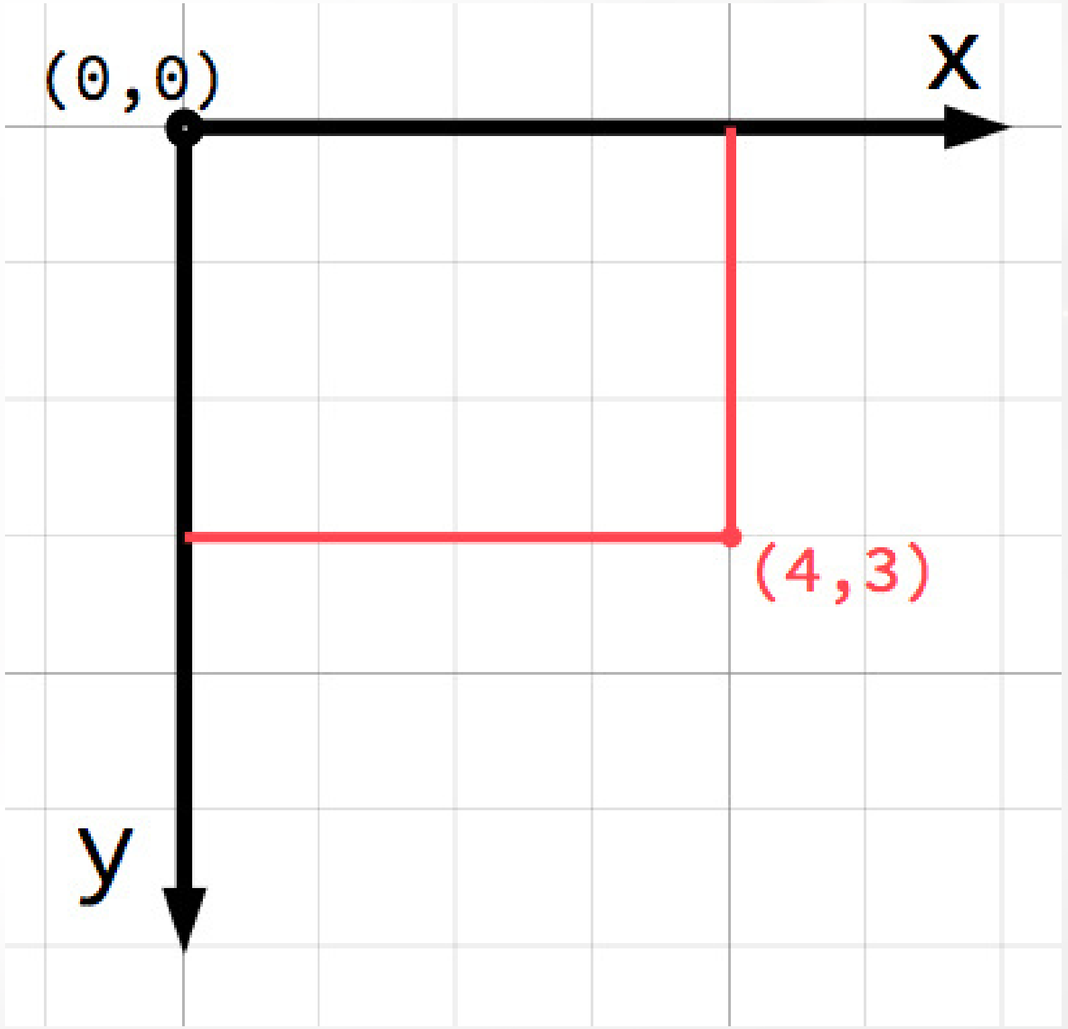
GAME LIBRARY IN PYTHON

- pip install pygame-ce

- set_caption
- display.set_mode
- draw
- collideрect
- ឆែកមើលទង្គិច ចតុកោណ

PYGAME

2D COORDINATE SYSTEM



PYGAME

LET'S MAKE A GAME :DDD

LEARN MORE

ABSTRACTION AND DECOMPOSITION

https://ocw.mit.edu/courses/...