THE Python Academy

LEARN BY DOING

Foundations Of Python I

Agenda for Today

- Class Intro and Objectives
- Python Installation
- What is Python?
- Packages Installation
- Let’s get coding!

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Class Introduction & Objectives

- **Foundations of Python is meant to give you the <u>foundations</u> of the programming language**
  - **Does NOT include everything there is to know about python**
  - **Is a general purpose class geared towards giving you basis for your future path**
    - **Data Science**
    - **Software Engineering**
    - **Automation**
    - **Robotics**

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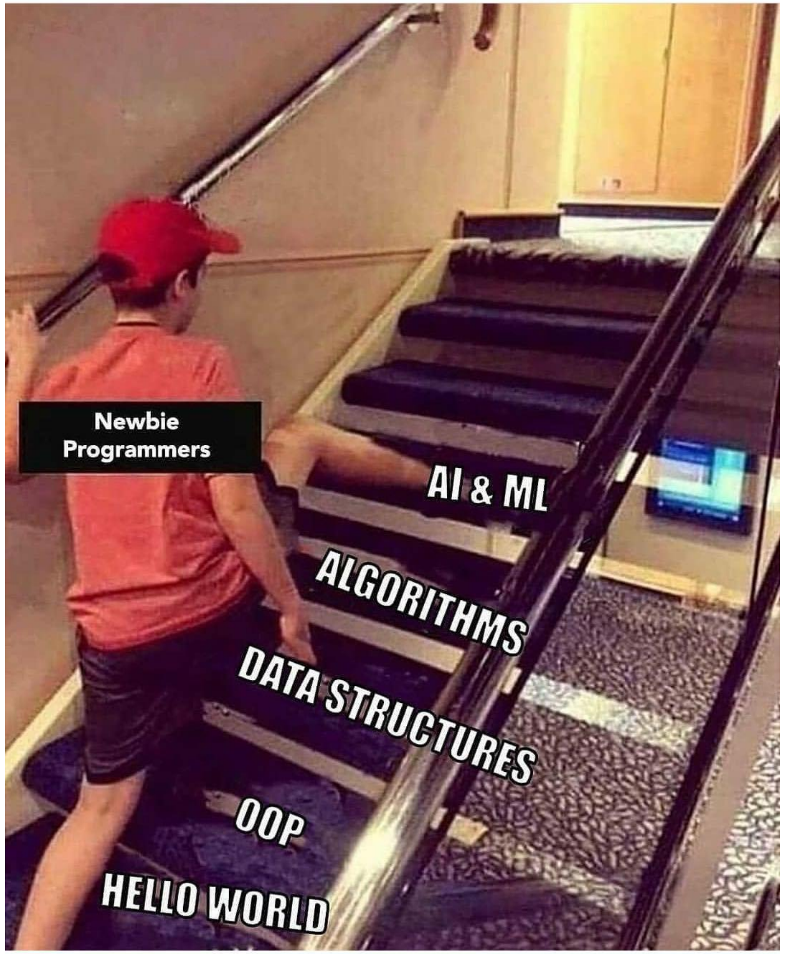
Class Introduction & Objectives

- **50% Concepts + 50% Coding**
- **You need to spend time outside of the class coding**
  - **By just showing up to class, you will NOT be successful**
  - **Do your homework**
  - **Things accumulate fast!**
- **If you don’t get it right the first time, IT’S OKAY! Unless you have a background in CS, nobody does**

Class Introduction & Objectives

- **Lastly… don’t expect to be pro in months, it’s a journey**



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Class Introduction & Objectives

- **At the end of each lecture, you will be given homework to do for the next class**
- **At the beginning of each class, we will review homework together then go over new material**
- **All material covered is publicly available here:**

https://github.com/ThePythonAcademy/Foundations-of-Python

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Certification Program

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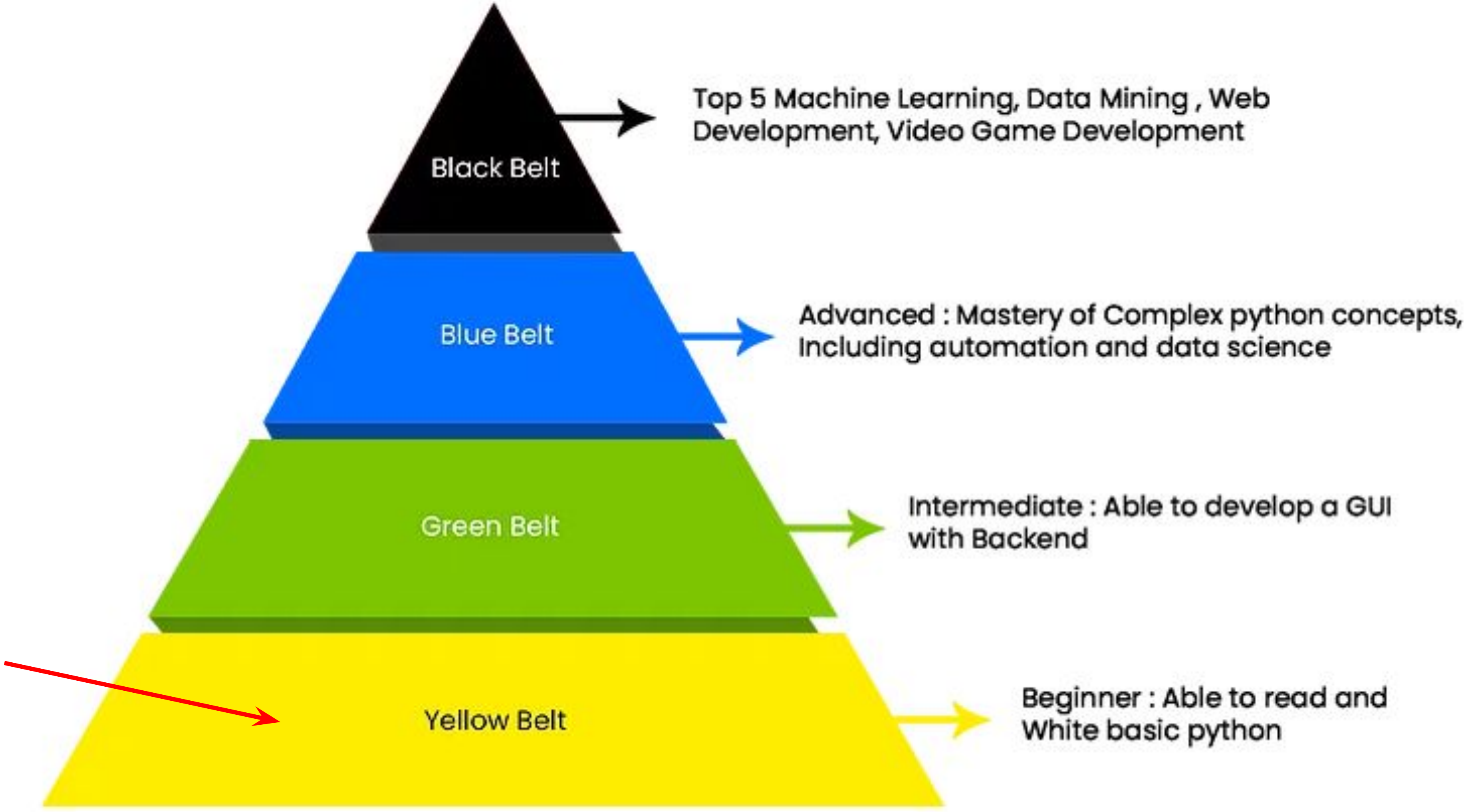
Black Belt
Top 5 Machine Learning, Data Mining , Web Development, Video Game Development
Blue Belt
Advanced : Mastery of Complex python concepts, Including automation and data science
Green Belt
Intermediate : Able to develop a GUI with Backend
Yellow Belt
Beginner : Able to read and White basic python

You are here!

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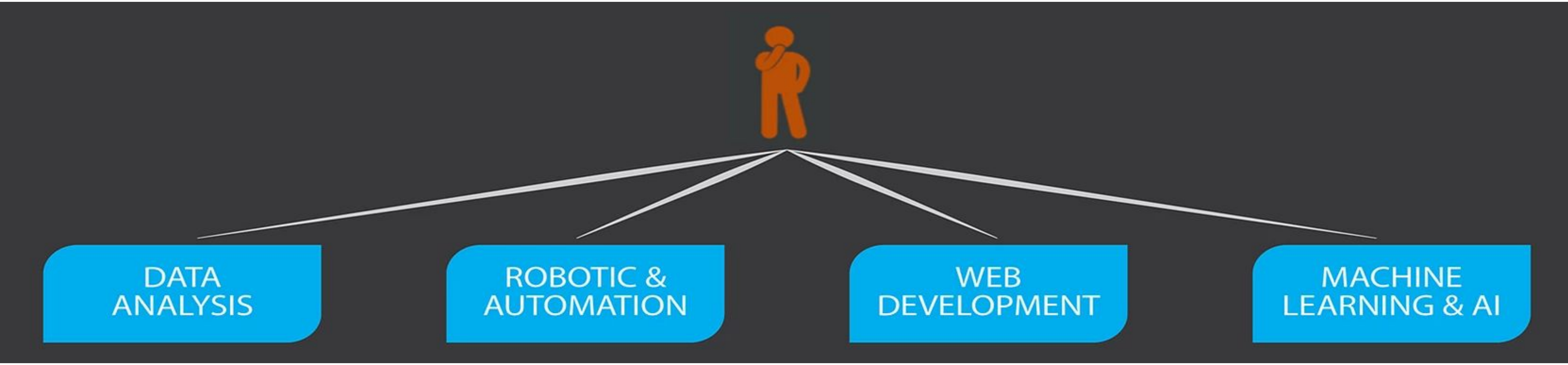
Where you can go



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Let’s get started!

Python Installation

- **Anaconda – a distribution of python**
  - **Not only includes python, but all the data science libraries**
  - **All-in-one installation**
- **To install:**
  - https://www.anaconda.com/download
  - **Follow teacher's instructions**

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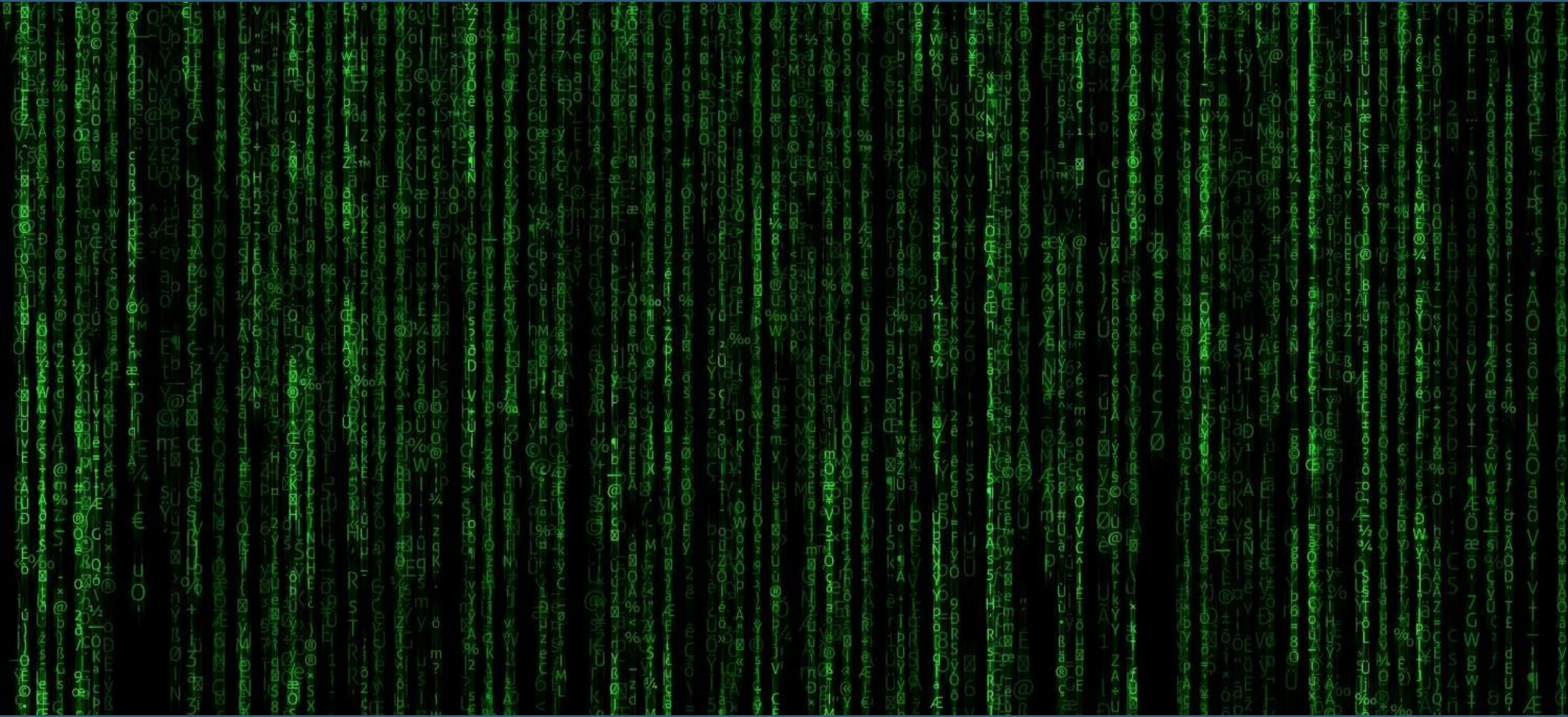
- **PyCharm – an Integrated Development Environment**
  - **General purpose development environment for everything python**
  - **Pip install for package installation**
- **To install:**
  - https://www.jetbrains.com/pycharm/download/#section=windows

What is Python?



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What is Python?

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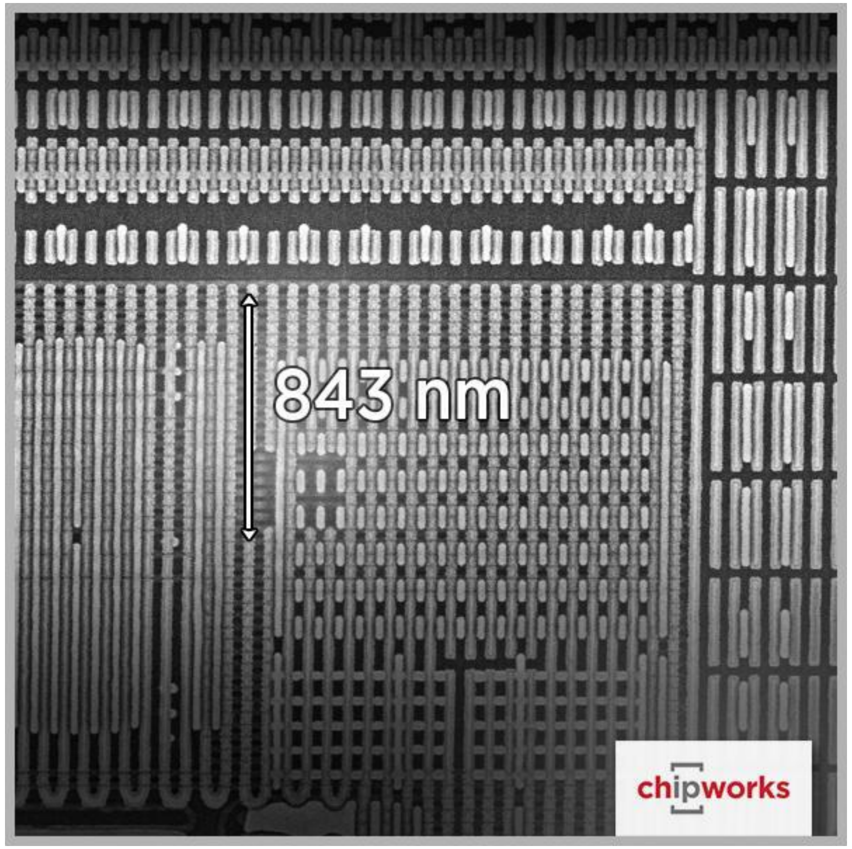
Key Takeaways for Binary

- EVERYTHING the computer does is ultimately binary



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The ASCII Code

Dec	Bin	Hex	Char	Dec	Bin	Hex	Char	Dec	Bin	Hex	Char	Dec	Bin	Hex	Char
0	0000 0000	00	[NUL]	32	0010 0000	20	space	64	0100 0000	40	@	96	0110 0000	60	`
1	0000 0001	01	[SOH]	33	0010 0001	21	!	65	0100 0001	41	A	97	0110 0001	61	a
2	0000 0010	02	[STX]	34	0010 0010	22	"	66	0100 0010	42	B	98	0110 0010	62	b
3	0000 0011	03	[ETX]	35	0010 0011	23	#	67	0100 0011	43	C	99	0110 0011	63	c
4	0000 0100	04	[EOT]	36	0010 0100	24	$	68	0100 0100	44	D	100	0110 0100	64	d
5	0000 0101	05	[ENQ]	37	0010 0101	25	%	69	0100 0101	45	E	101	0110 0101	65	e
6	0000 0110	06	[ACK]	38	0010 0110	26	&	70	0100 0110	46	F	102	0110 0110	66	f
7	0000 0111	07	[BEL]	39	0010 0111	27	'	71	0100 0111	47	G	103	0110 0111	67	g
8	0000 1000	08	[BS]	40	0010 1000	28	(	72	0100 1000	48	H	104	0110 1000	68	h
9	0000 1001	09	[TAB]	41	0010 1001	29	)	73	0100 1001	49	I	105	0110 1001	69	i
10	0000 1010	0A	[LF]	42	0010 1010	2A	*	74	0100 1010	4A	J	106	0110 1010	6A	j
11	0000 1011	0B	[VT]	43	0010 1011	2B	+	75	0100 1011	4B	K	107	0110 1011	6B	k
12	0000 1100	0C	[FF]	44	0010 1100	2C	,	76	0100 1100	4C	L	108	0110 1100	6C	l
13	0000 1101	0D	[CR]	45	0010 1101	2D	-	77	0100 1101	4D	M	109	0110 1101	6D	m
14	0000 1110	0E	[SO]	46	0010 1110	2E	.	78	0100 1110	4E	N	110	0110 1110	6E	n
15	0000 1111	0F	[SI]	47	0010 1111	2F	/	79	0100 1111	4F	O	111	0110 1111	6F	o
16	0001 0000	10	[DLE]	48	0011 0000	30	0	80	0101 0000	50	P	112	0111 0000	70	p
17	0001 0001	11	[DC1]	49	0011 0001	31	1	81	0101 0001	51	Q	113	0111 0001	71	q
18	0001 0010	12	[DC2]	50	0011 0010	32	2	82	0101 0010	52	R	114	0111 0010	72	r
19	0001 0011	13	[DC3]	51	0011 0011	33	3	83	0101 0011	53	S	115	0111 0011	73	s
20	0001 0100	14	[DC4]	52	0011 0100	34	4	84	0101 0100	54	T	116	0111 0100	74	t
21	0001 0101	15	[NAK]	53	0011 0101	35	5	85	0101 0101	55	U	117	0111 0101	75	u
22	0001 0110	16	[SYN]	54	0011 0110	36	6	86	0101 0110	56	V	118	0111 0110	76	v
23	0001 0111	17	[ETB]	55	0011 0111	37	7	87	0101 0111	57	W	119	0111 0111	77	w
24	0001 1000	18	[CAN]	56	0011 1000	38	8	88	0101 1000	58	X	120	0111 1000	78	x
25	0001 1001	19	[EM]	57	0011 1001	39	9	89	0101 1001	59	Y	121	0111 1001	79	y
26	0001 1010	1A	[SUB]	58	0011 1010	3A	:	90	0101 1010	5A	Z	122	0111 1010	7A	z
27	0001 1011	1B	[ESC]	59	0011 1011	3B	;	91	0101 1011	5B	[	123	0111 1011	7B	{
28	0001 1100	1C	[FS]	60	0011 1100	3C	<	92	0101 1100	5C	\	124	0111 1100	7C	|
29	0001 1101	1D	[GS]	61	0011 1101	3D	=	93	0101 1101	5D	]	125	0111 1101	7D	}
30	0001 1110	1E	[RS]	62	0011 1110	3E	>	94	0101 1110	5E	^	126	0111 1110	7E	~
31	0001 1111	1F	[US]	63	0011 1111	3F	?	95	0101 1111	5F	_	127	0111 1111	7F	[DEL]

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Writing in binary

How do you write CAT in binary?

C	A	T
01100011	01100001	01110100

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Fun Info

- What is a BIT? (hint: BIT = Binary Digit)

01100011 01100001 01110100

- What is a BYTE?
  - Unit of storage capable of holding a **single** character
  - On almost all modern computers, a byte is equal to **8 bits**

01100011 01100001 01110100

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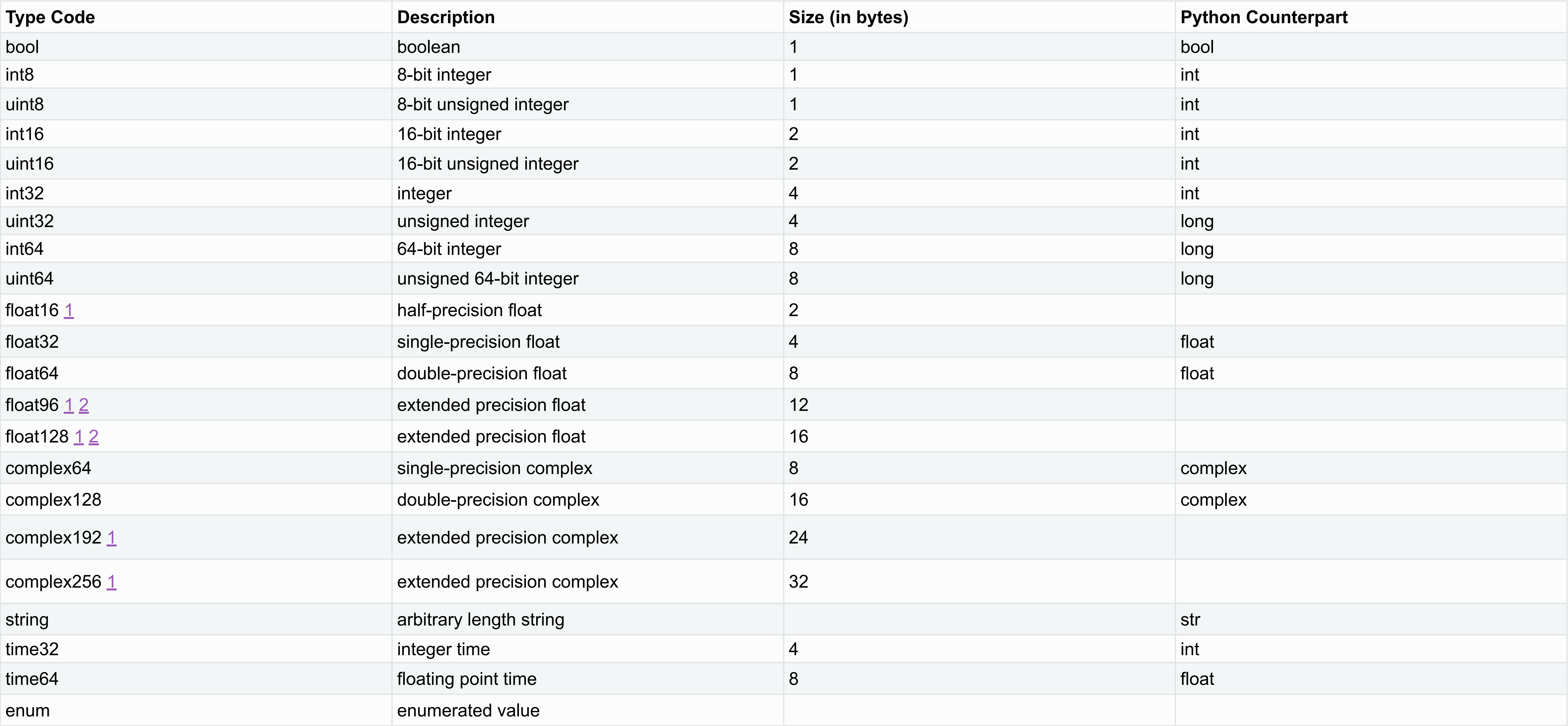
Memory is finite --> storage needs to be efficient!

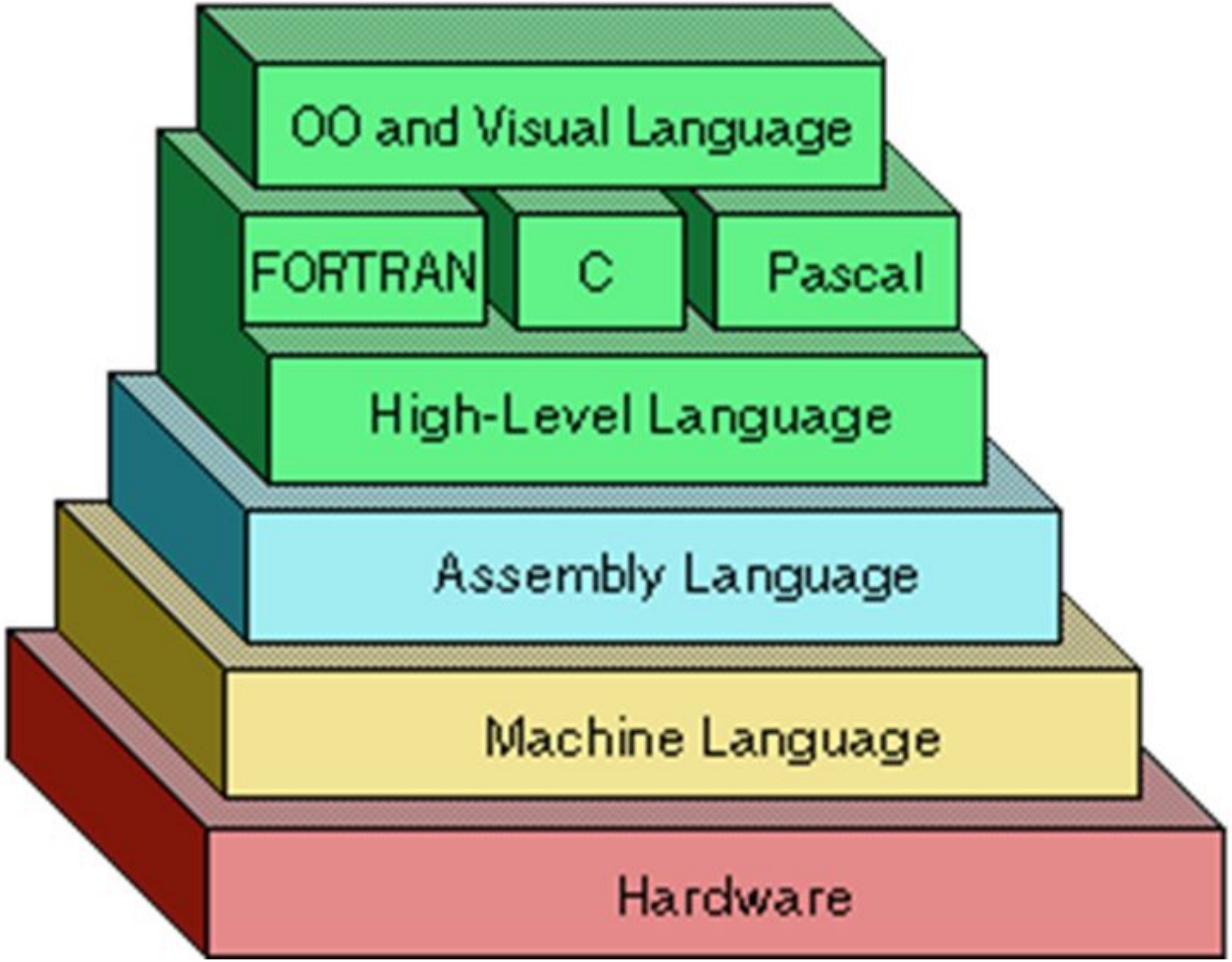
001010101000000101010101011110101010101010 001010101000000101010101011110101010101010
001010101000000101010101011110101010101010 001010101000000101010101011110101010101010
001010101000000101010101011110101010101010 001010101000000101010101011110101010101010
001010101000000101010101011110101010101010 001010101000000101010101011110101010101010
001010101000000101010101011110101010101010 001010101000000101010101011110101010101010
001010101000000101010101011110101010101010 001010101000000101010101011110101010101010
001010101000000101010101011110101010101010 001010101000000101010101011110101010101010
001010101000000101010101011110101010101010 001010101000000101010101011110101010101010
001010101000000101010101011110101010101010 001010101000000101010101011110101010101010
001010101000000101010101011110101010101010 001010101000000101010101011110101010101010
001010101000000101010101011110101010101010 001010101000000101010101011110101010101010
001010101000000101010101011110101010101010 001010101000000101010101011110101010101010
001010101000000101010101011110101010101010 001010101000000101010101011110101010101010
001010101000000101010101011110101010101010 001010101000000101010101011110101010101010
001010101000000101010101011110101010101010 001010101000000101010101011110101010101010
001010101000000101010101011110101010101010 001010101000000101010101011110101010101010

Variable Types



Type Code	Description	Size (in bytes)	Python Counterpart
bool	boolean	1	bool
int8	8-bit integer	1	int
uint8	8-bit unsigned integer	1	int
int16	16-bit integer	2	int
uint16	16-bit unsigned integer	2	int
int32	integer	4	int
uint32	unsigned integer	4	long
int64	64-bit integer	8	long
uint64	unsigned 64-bit integer	8	long
float16[1]	half-precision float	2	
float32	single-precision float	4	float
float64	double-precision float	8	float
float96[1][2]	extended precision float	12	
float128[1][2]	extended precision float	16	
complex64	single-precision complex	8	complex
complex128	double-precision complex	16	complex
complex192[1]	extended precision complex	24	
complex256[1]	extended precision complex	32	
string	arbitrary length string		str
time32	integer time	4	int
time64	floating point time	8	float
enum	enumerated value		

The 5 Generations of Languages



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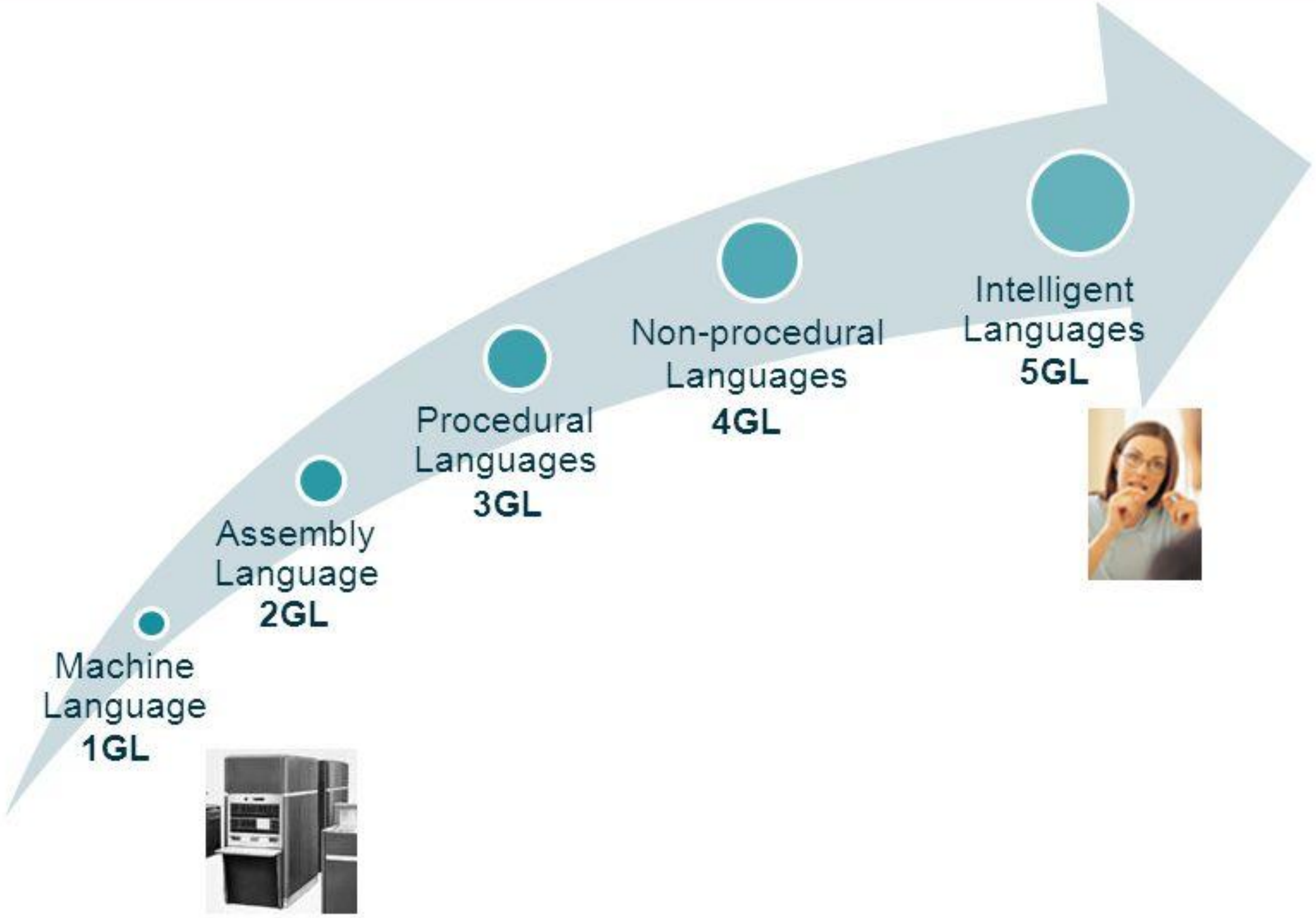
Where is Python?



Machine Language 1GL

Assembly Language 2GL

Procedural Languages 3GL

Non-procedural Languages 4GL

Intelligent Languages 5GL

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Where is Python?

Python is
an interpreted, high-level, general-purpose programming language

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But wait… there are many programming languages… why python?

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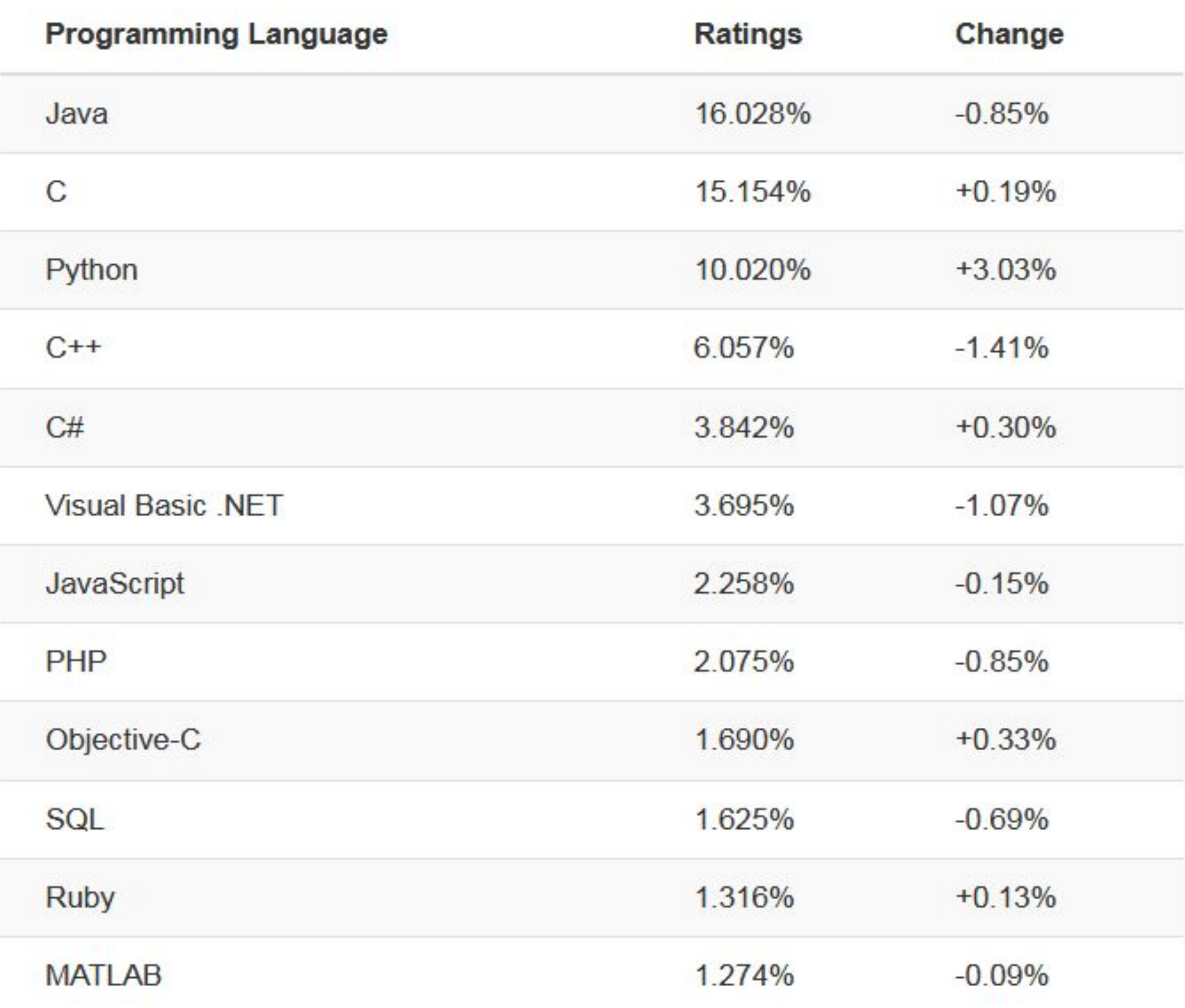
Programming Languages



Programming Language	Ratings	Change
Java	16.028%	-0.85%
C	15.154%	+0.19%
Python	10.020%	+3.03%
C++	6.057%	-1.41%
C#	3.842%	+0.30%
Visual Basic .NET	3.695%	-1.07%
JavaScript	2.258%	-0.15%
PHP	2.075%	-0.85%
Objective-C	1.690%	+0.33%
SQL	1.625%	-0.69%
Ruby	1.316%	+0.13%
MATLAB	1.274%	-0.09%

Why Python?

1. **Simple & Easy to Learn**
2. **Versatility**
3. **High demand**
4. **Huge community**
5. **Free & Open Source**
6. **Great packages for Data Science and Machine Learning**

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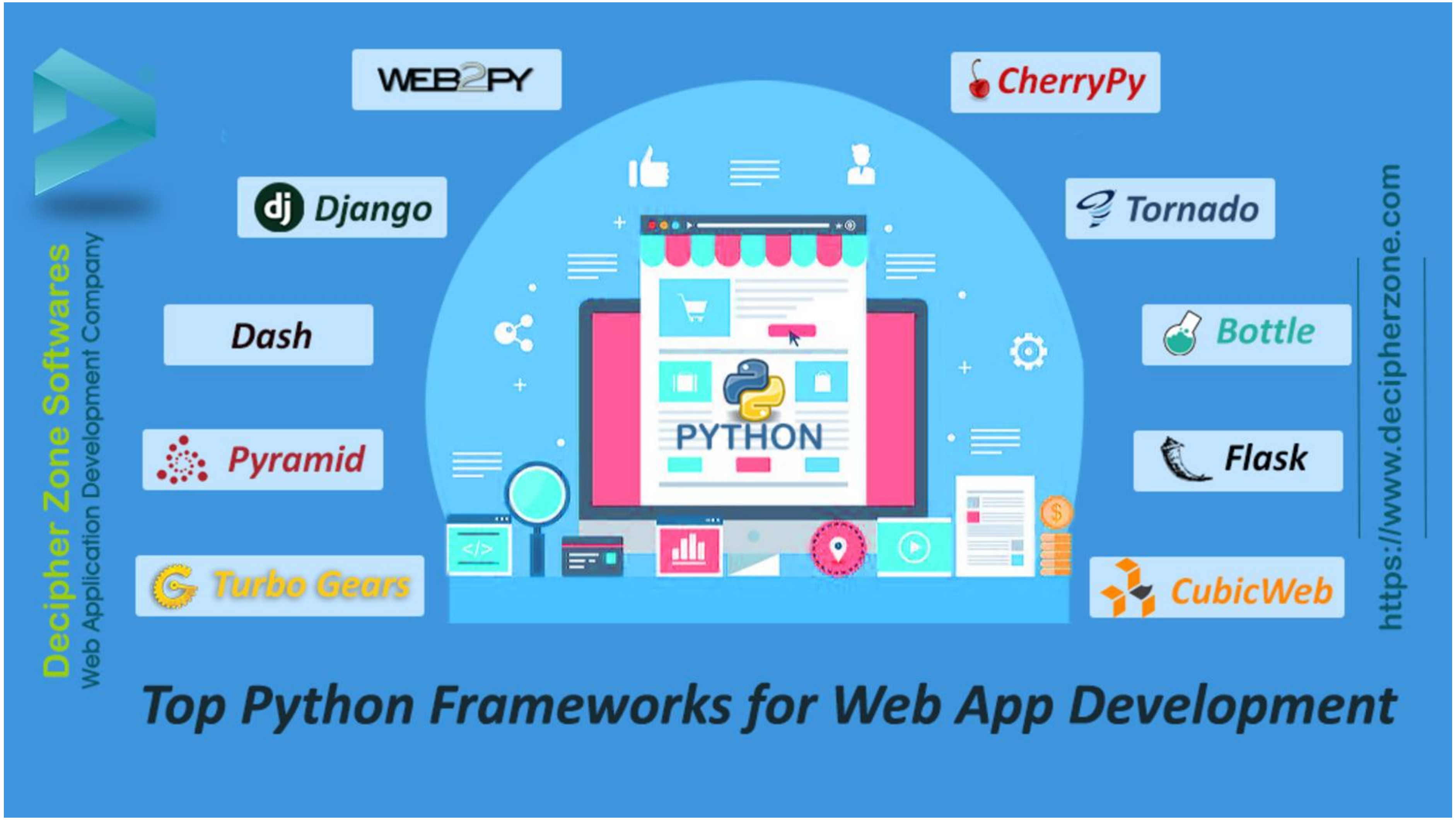
The Power of Python


WEB2PY
CherryPy
Django
Tornado
Dash
Bottle
Pyramid
Flask
Turbo Gears
CubicWeb
PYTHON
Decipher Zone Softwares
Web Application Development Company
https://www.decipherzone.com
Top Python Frameworks for Web App Development

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Applications built with Python

Instagram

Pinterest

Spotify

Dropbox

Uber

Reddit

Applications built with Python

"It all got started, I believe, because the very earliest Googlers (Sergey, Larry, Craig, …) made a good engineering decision: "Python where we can, C++ where we must."

Alex Martelli

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What’s the catch ?

What’s the catch?

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The Drawbacks

1. **It’s SLOW compared to other languages**
2. **Exceptions can sometimes be hard to decrypt**
3. **Not smartphone friendly**
4. **Memory utilization is so-so**
5. **Not much flexibility around database management**

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Python Installation

Okay… we are ready to start coding!

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