Python In Neuroscience

Session 1:
Introduction of Python Programming

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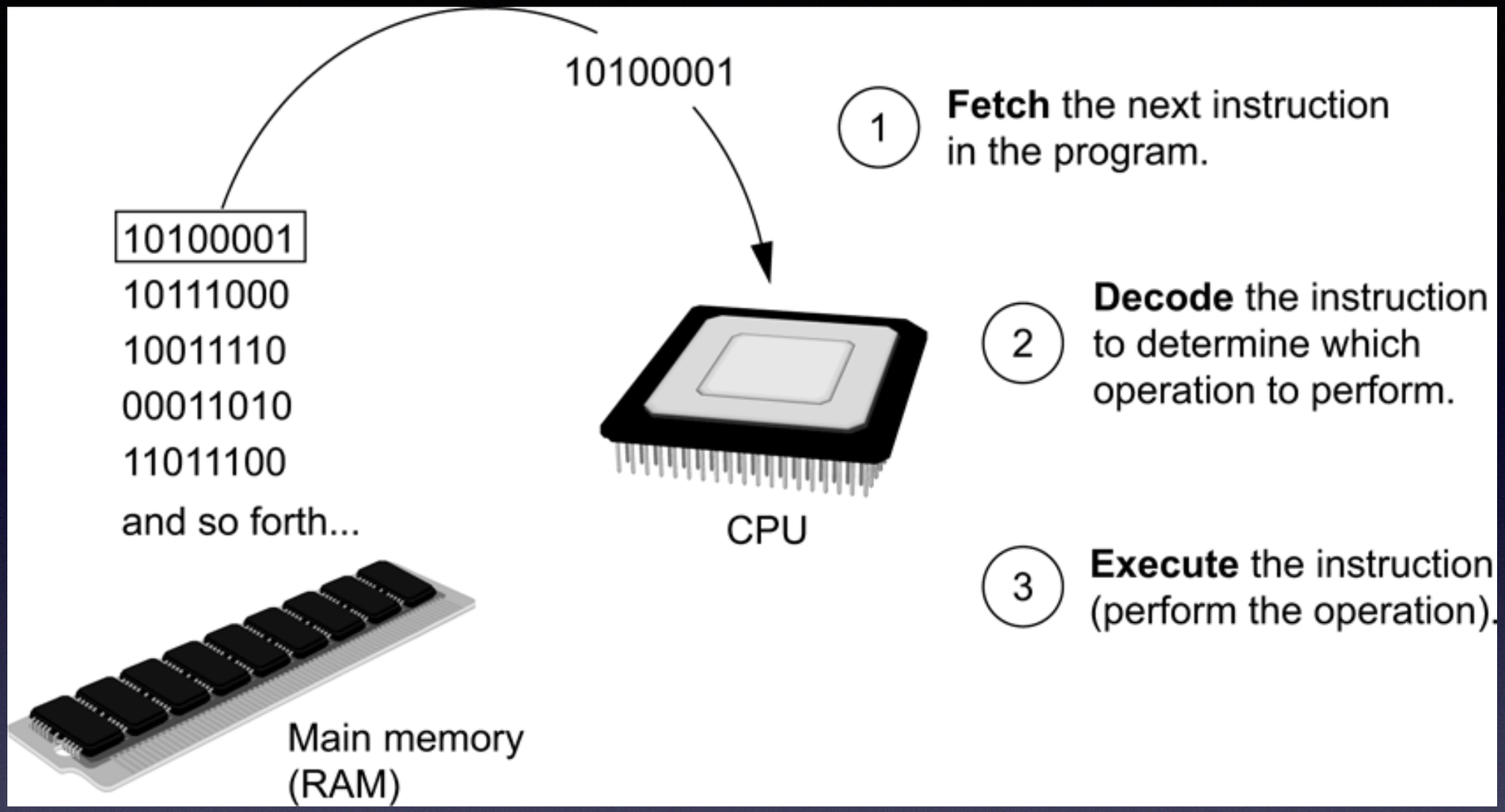
But, not really complicated!

- Follow some rules :
  - The result is not the only matter
  - Different steps need to look forward
  - **Syntax**

Case and You

Ram and ROM

- ROM (read-only memory)
- RAM (random-access memory)
- chip: ROM can hold data without power and RAM cannot. Essentially, ROM is meant for permanent storage, and RAM is for temporary storage.



Upper Level

Fetch-decode-execute cycle is the term used when the CPU executes the instructions in a program. The cycle consist of three steps:

Fetch
Decode
Execute

Welcome to 0 1 World

A computer’s memory is divided into tiny storage locations known as bytes

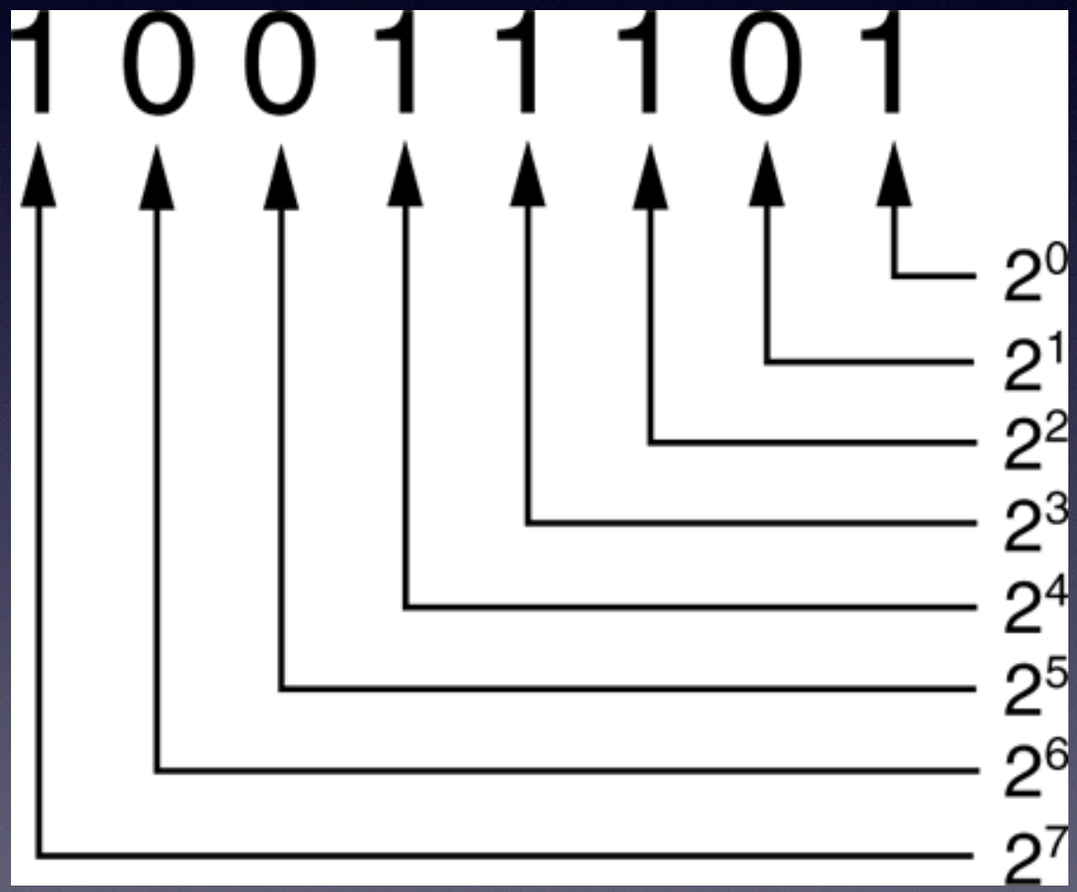
One byte represents one number

A byte is divided into eight smaller storage locations known as bits (binary digits)

Bits are tiny electrical components that can hold either a positive or a negative charge.

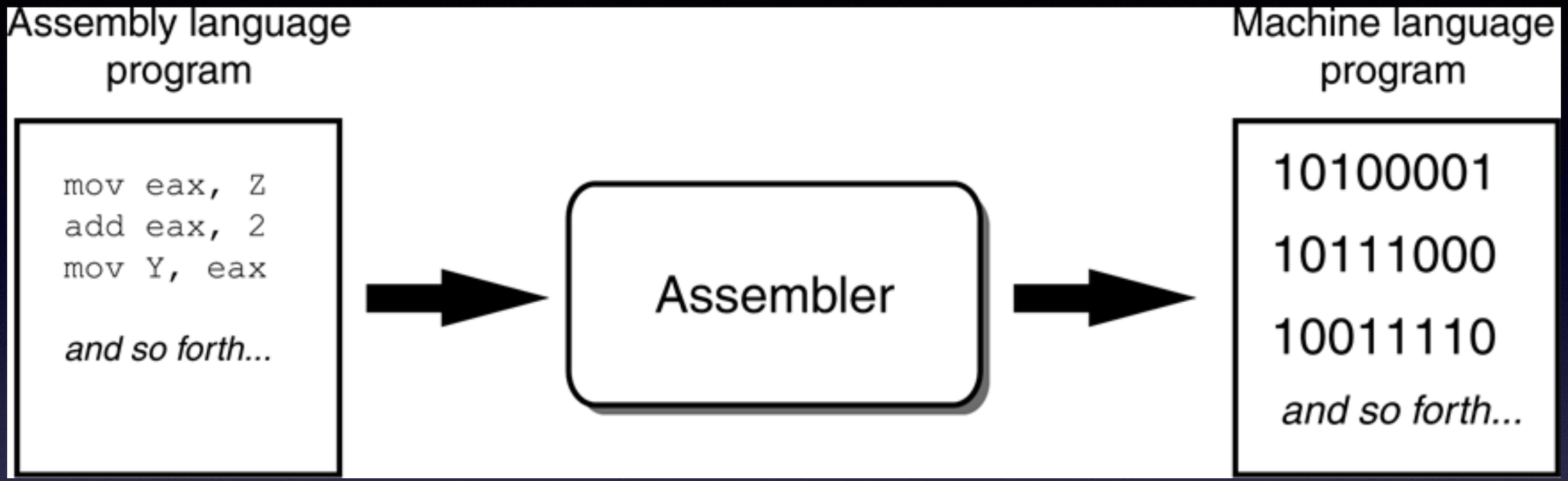
A positive charge is similar to a switch in the on position

A negative charge is similar to a switch in the off position



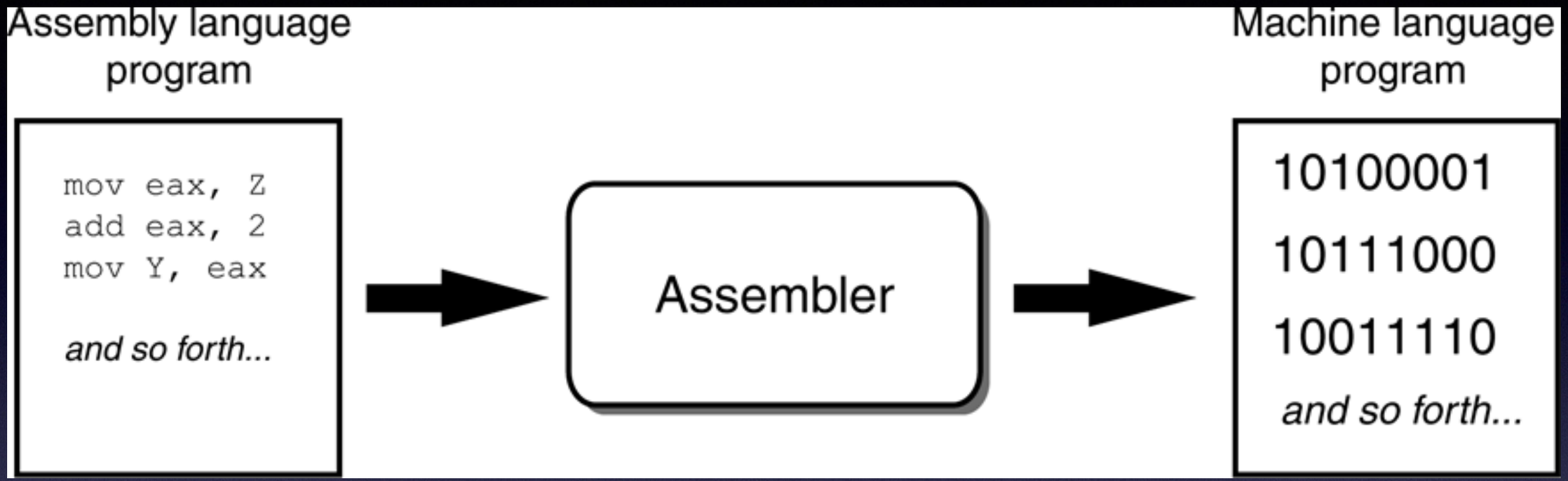
Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char
0	0	[NULL]	32	20	[SPACE]	64	40	@	96	60	`
1	1	[START OF HEADING]	33	21	!	65	41	A	97	61	a
2	2	[START OF TEXT]	34	22	"	66	42	B	98	62	b
3	3	[END OF TEXT]	35	23	#	67	43	C	99	63	c
4	4	[END OF TRANSMISSION]	36	24	$	68	44	D	100	64	d
5	5	[ENQUIRY]	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	[ENG 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]

ASCII



What we want to do?

Programs Basic



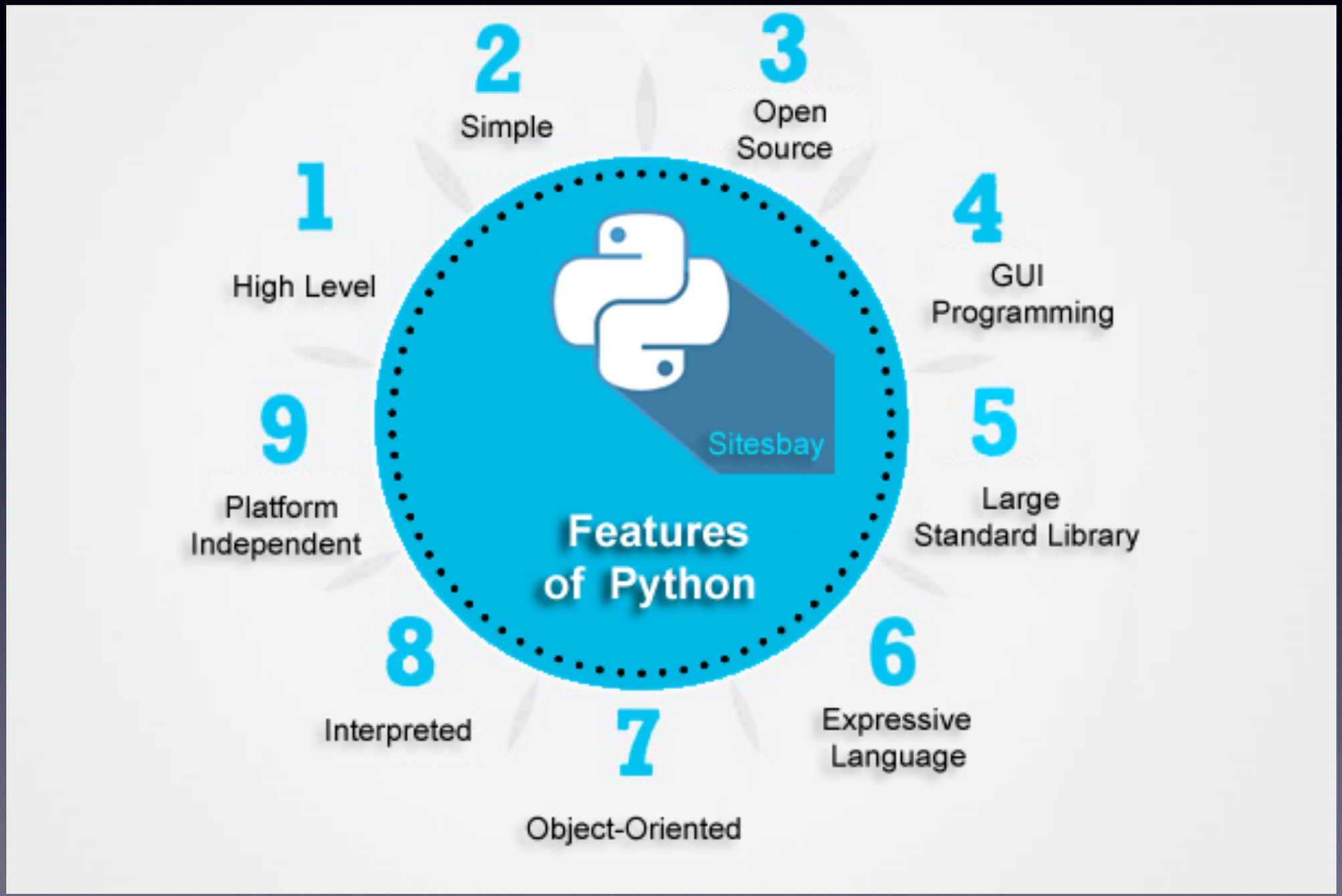
What we want to do?


Linux
MS DOS
ubuntu
BlackBerry
Mac OS
ANDROID
Apple
Microsoft
Windows
EssayCorp

Where we are?

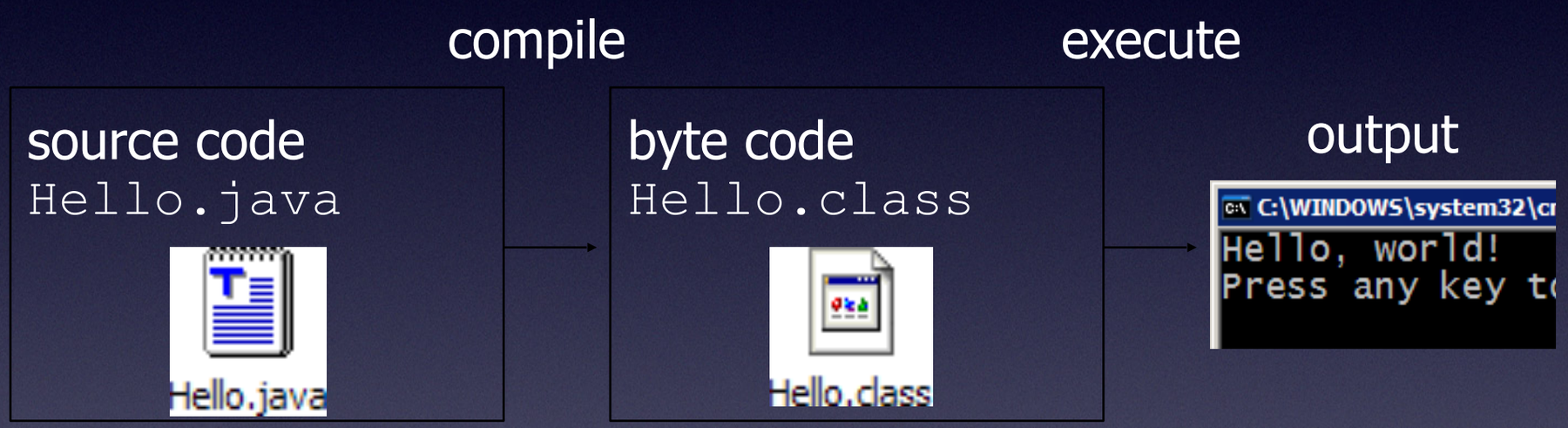
KEEP CALM AND CODE PYTHON

Why Python?

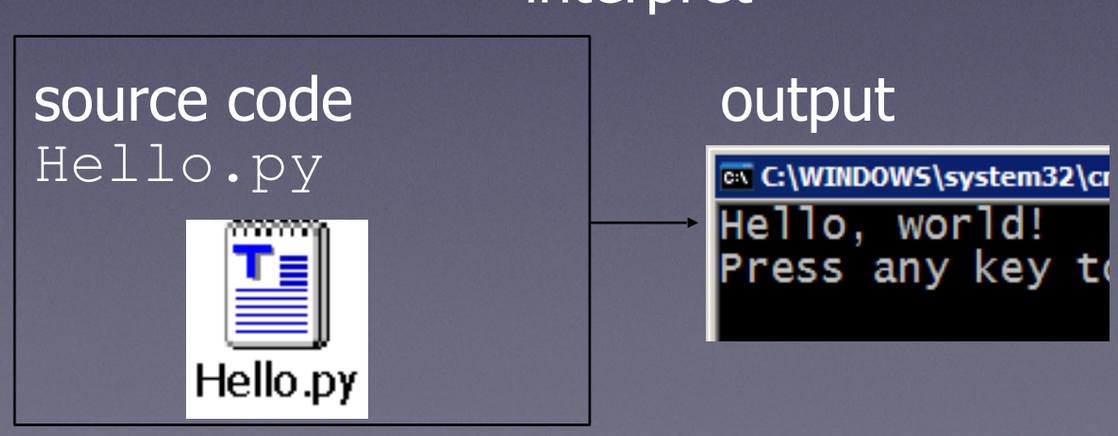

1
High Level
2
Simple
3
Open
Source
4
GUI
Programming
5
Large
Standard Library
6
Expressive
Language
7
Object-Oriented
8
Interpreted
9
Platform
Independent
Features
of Python
Sitesbay

Python vs Java

- Many languages require you to *compile* (translate) your program into a form that the machine understands.



- Python is instead directly *interpreted* into machine instructions.
-



Program.cs*

HelloWorld.Program

```
1  using System;
2  using System.Collections.Generic;
3  using System.Linq;
4  using System.Text;
5
6  namespace HelloWorld {
7      class Program {
8          static void Main(string[] args) {
9              Console.WriteLine("Hello World");
10             Console.ReadKey();
11         }
12     }
13 }
14
```

HelloWorld.java

```
package com.srccodes.example;

public class HelloWorld {

    /**
     * @param args
     */
    public static void main(String[] args) {
        // TODO Auto-generated method stub

    }

}
```

print('hello worl')

HelloWorld.cpp*

HelloWorld (Global Scope)

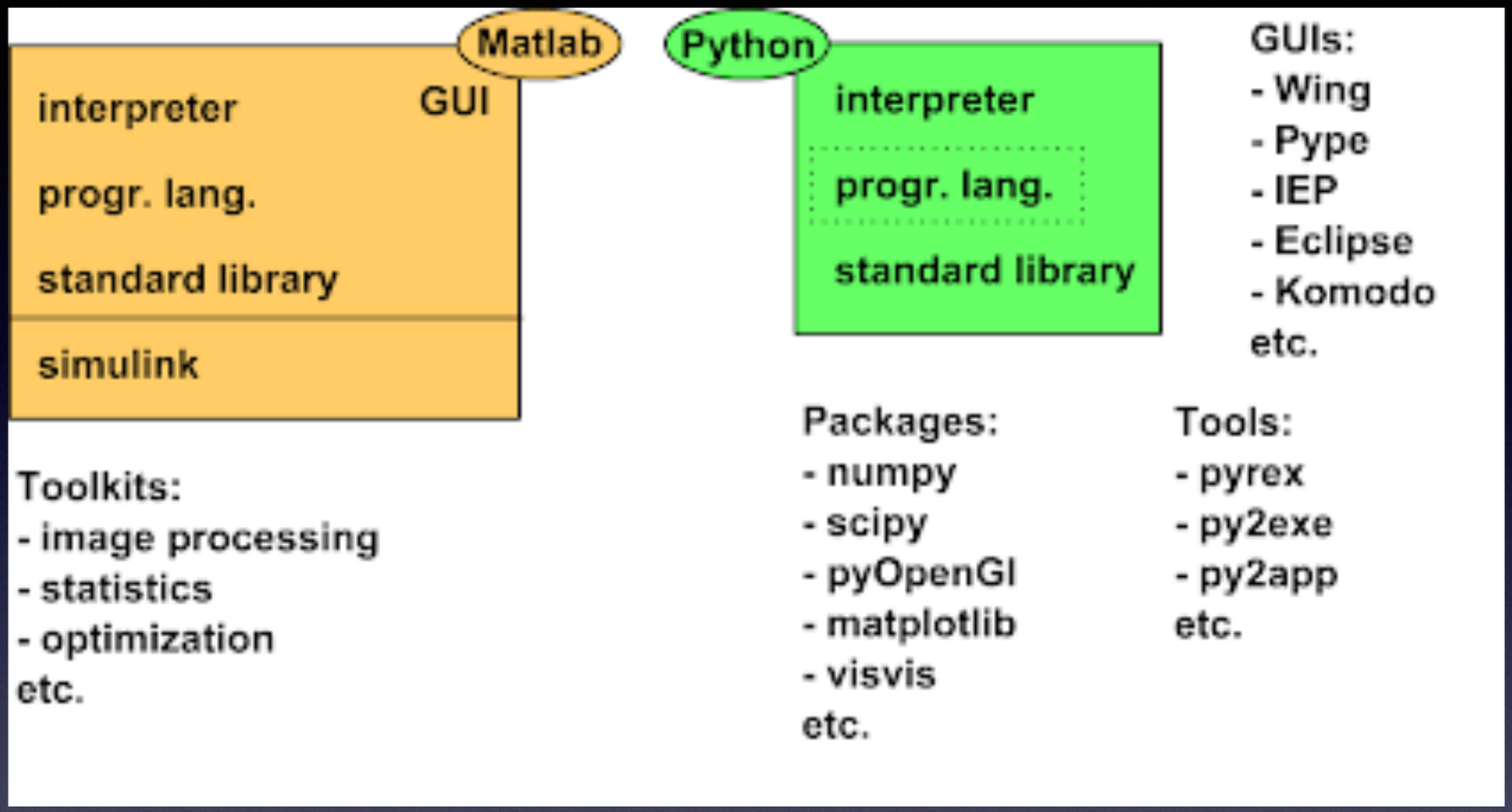
```
// HelloWorld.cpp : Defines the entry point for the console a
//

#include "stdafx.h"
#include <iostream>
using namespace std;

int main()
{
    cout << "Hello World! ";
    return 0;
}
```

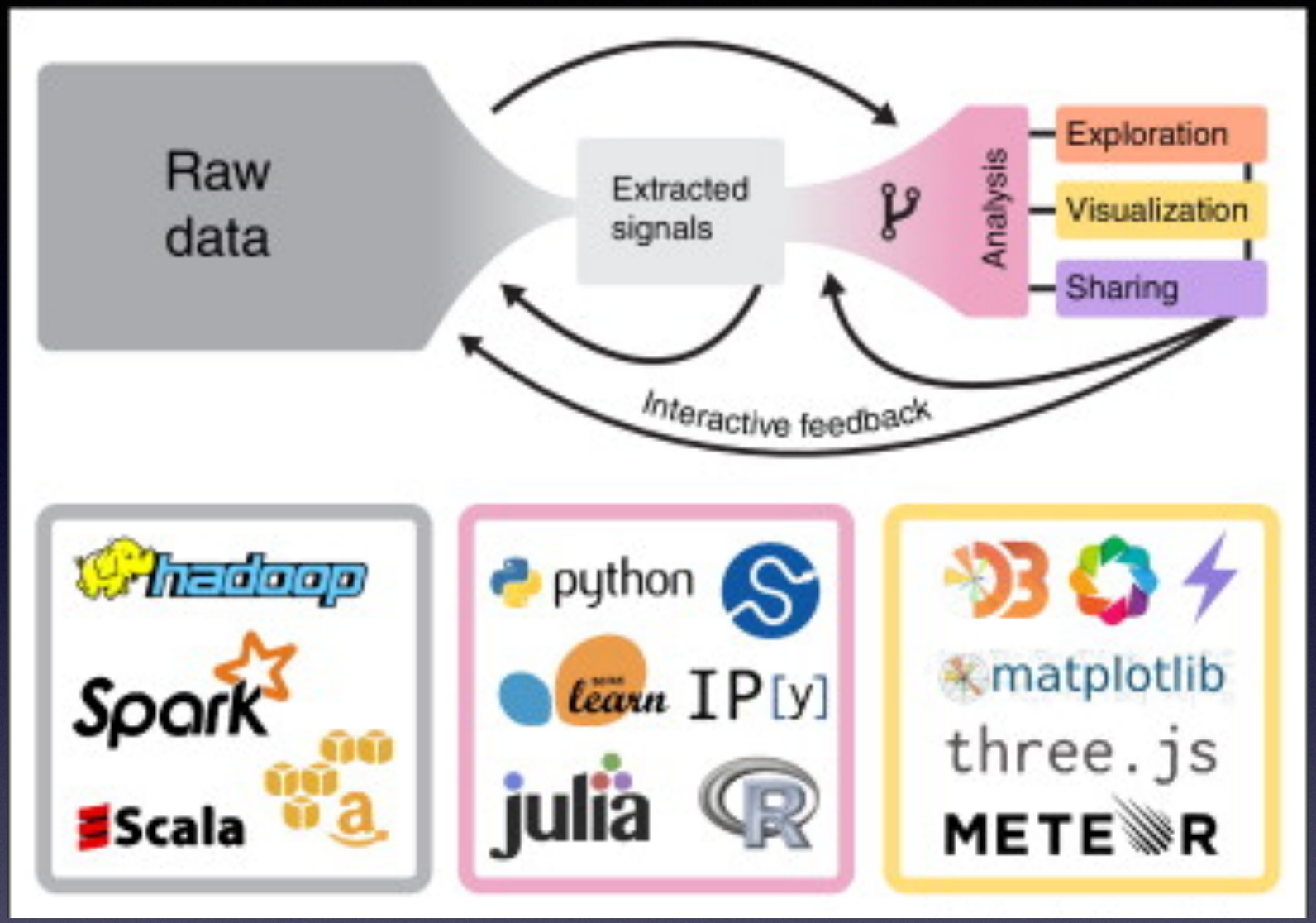
Python Vs ~~Matlab~~ 1

- MATLAB becomes increasingly useless as you get farther away from matrices. Python is equally good at everything.
    - Someday maybe I'll want to turn something into a stand-alone program with a GUI
    - pull data out of a pdf
    - interface with hardware and instruments
    - draw a 3D picture
    - write a script to reorganize files on my computer
        - Python always has a professional-quality module for it!



Python vs ~~Matlab~~ 2

It’s just Comedy PROGRAMM



Python

New way of being Expert

Python

- Python is a general-purpose programming language
- Python "**package**"/ "**module**" / "**library**" / "**framework**" is what you download (or write) to get additional functions and definitions. Examples:
  - NumPy for fast array computations and manipulations and linear algebra.
  - SciPy for optimization, image-processing, interpolation, numerical integration, etc.
  - Matplotlib for making graphs.

module

- **Module** is a file which contains python functions , global variables etc. It is nothing but .py file which has python executable code / statement.For example: Let's create a file Module.py:

```
def welcome_message(user_name):
    return "Welcome " + name
```

- statement.For example: Let's create a file Module.py:

```
import user
print user.welcome_message("Module")
```

package

- **Package** is namespace which contains multiple package/modules. It is a directory which contains a special file **__init__.py**

  - Let's create a directory **first.** Now this package contains multiple packages/modules to handle user related requests.

```
first/       # top level package
    __init__.py

    get/     # first subpackage
        __init__.py
        basic.py
        features.py
        preprocessing.py

    create/   # second subpackage
        __init__.py
        gui.py
        mac.py
```

- Now you can import it in following way

```
from user.get import basic # imports info module from get package
from user.create import gui #imports api module from create package
```

library

- It is collection of various packages. There is no difference between package and python library conceptually.

framework

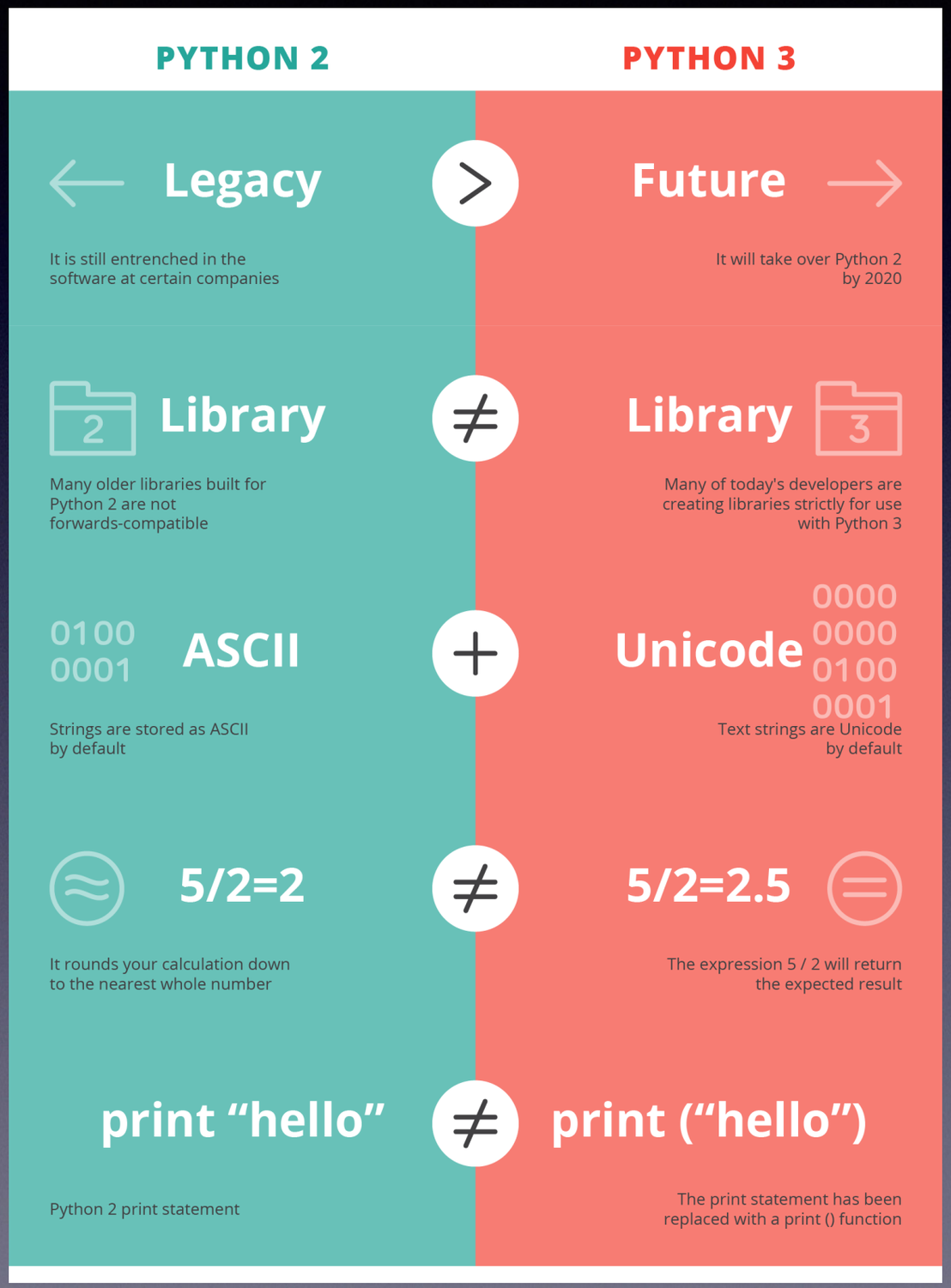
- It is a collection of various libraries which architects the code flow.
  - Django

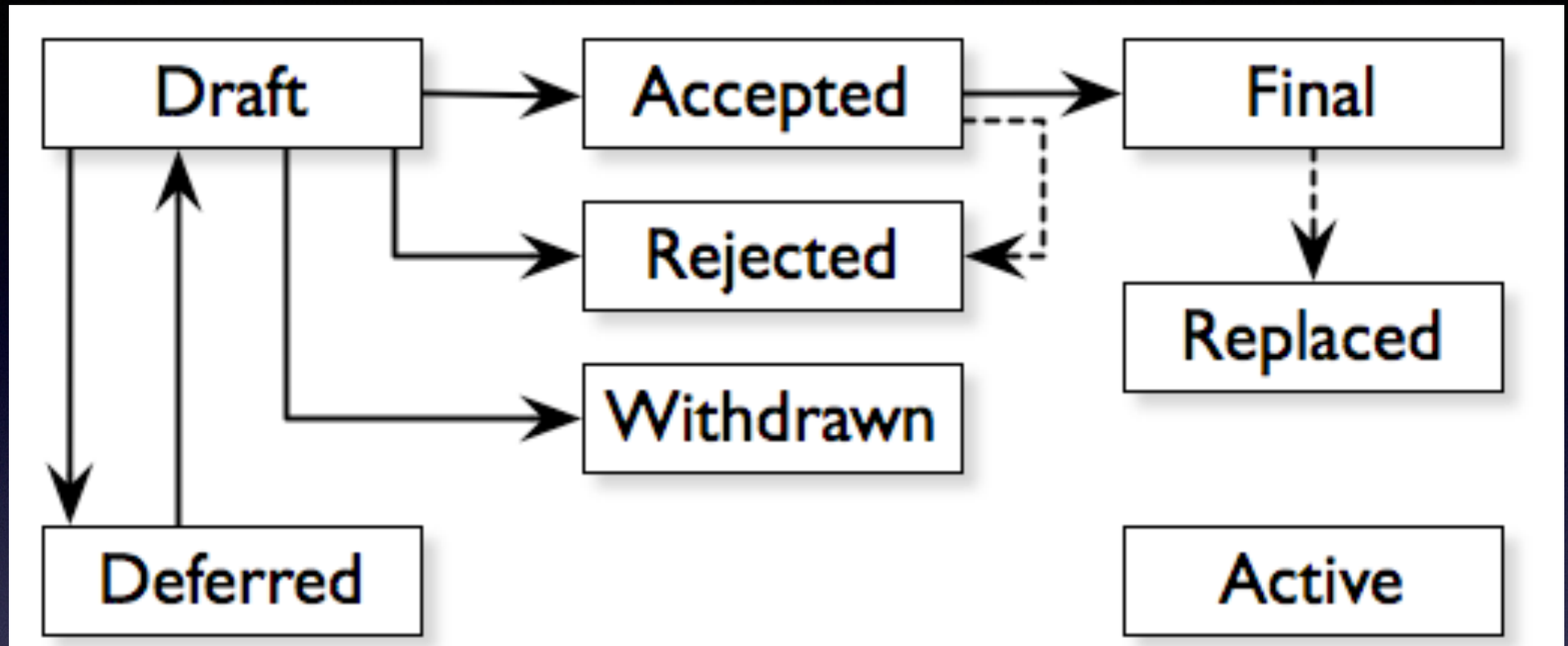
ASCII vs UNICODE

What we should do?
Just Accept it!

ASCII	VERSUS	UNICODE
ASCII		UNICODE
A character encoding standard for electronic communication		A computing industry standard for consistent encoding, representation, and handling of text expressed in most of the world's writing systems
Stands for American Standard Code for Information Interchange		Stands for Universal Character Set
Supports 128 characters		Supports a wide range of characters
Uses 7 bits to represent a character		Uses 8bit, 16bit or 32bit depending on the encoding type
Requires less space		Requires more speace

Python 2 vs Python 3





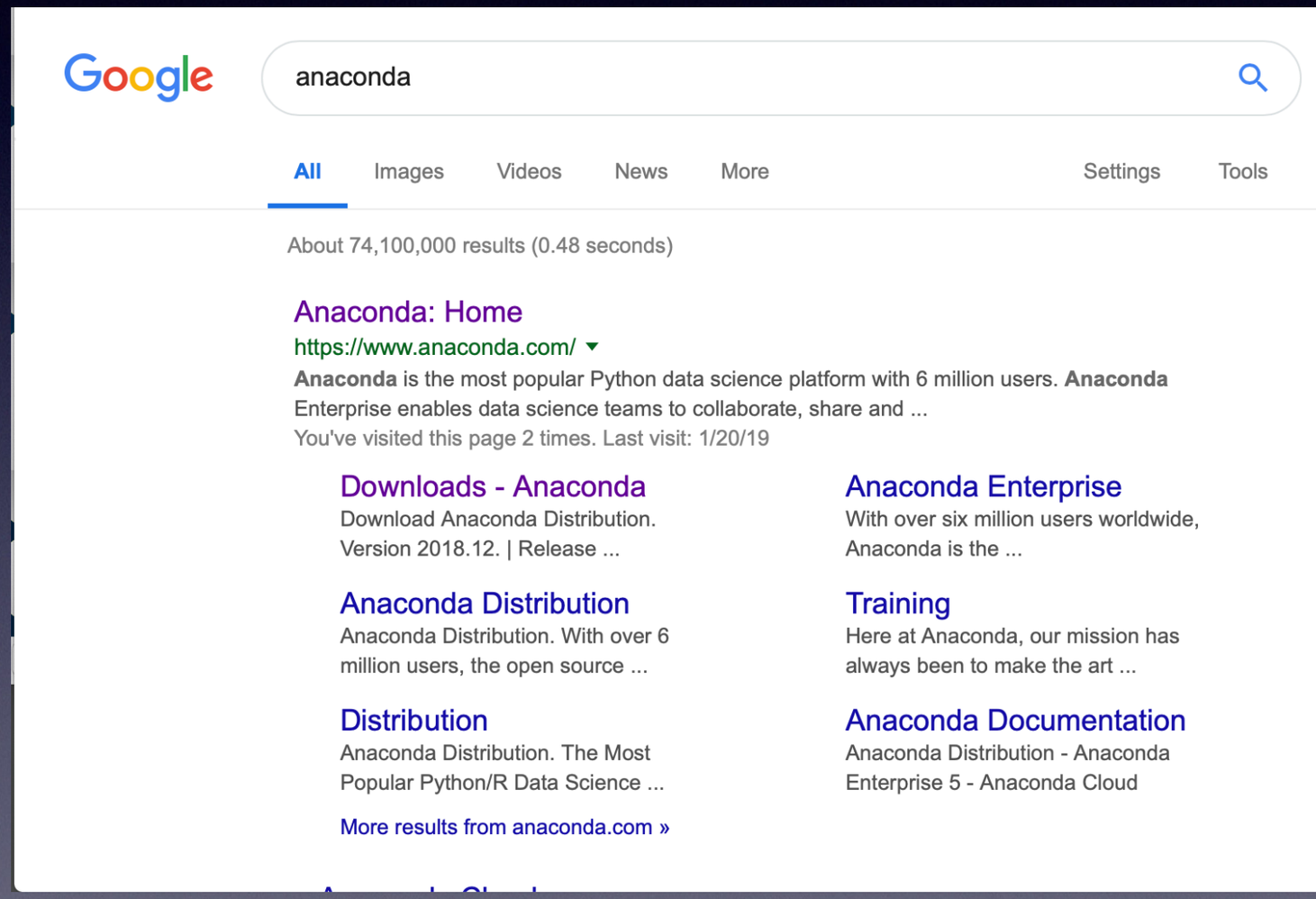
PEP

Python Enhancement Proposal

Anaconda (Python)

- The greatest Platform for ***Python***

- Download here:
  - https://www.anaconda.com/download/



ANACONDA®

Conda Prompt (Win)

- Managing your python version:

```
Conda —-version

conda update conda
```

Create your own env:

```
conda create —name python=3.5
```

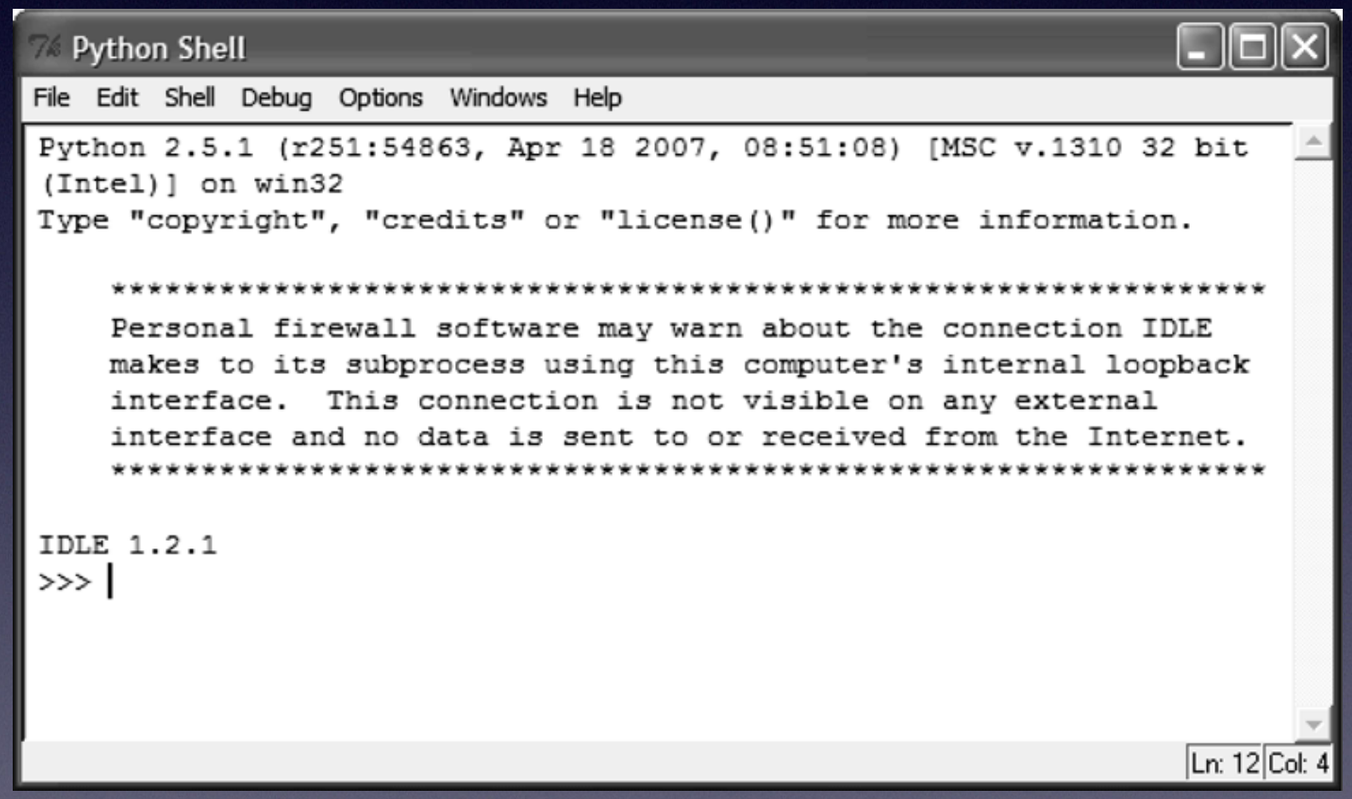
List of Packages:

```
conda list
```

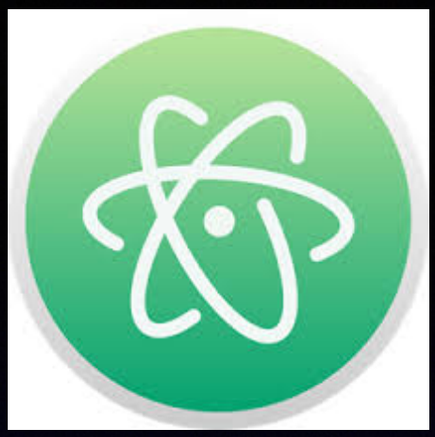
IDLE (Basic)

Different way of coding on python:

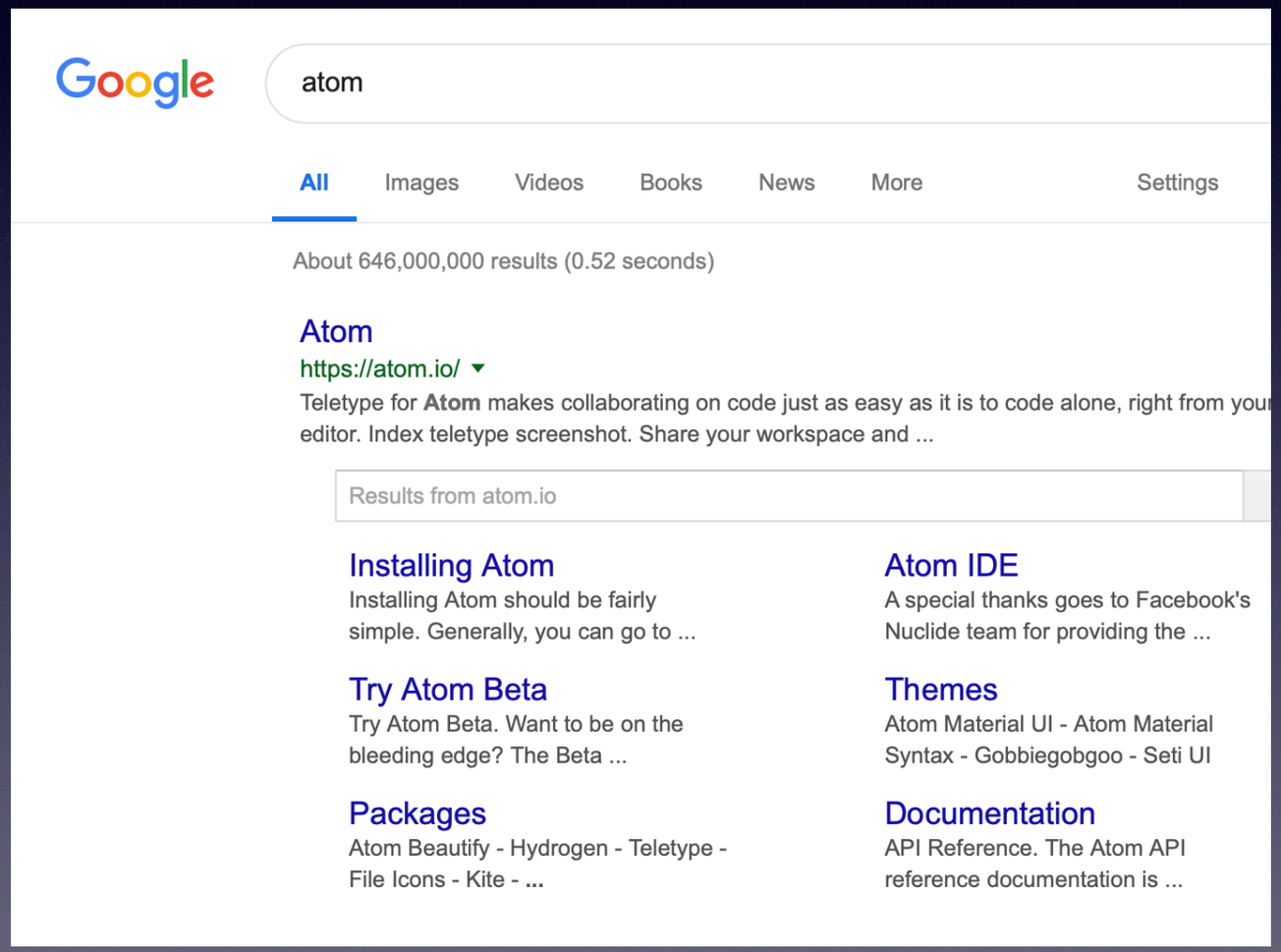
1. PyDev with Eclipse
2. Komodo
3. Emacs
4. Vim
5. TextMate
6. Gedit
7. Idle
8. PIDA (Linux)(VIM Based)
9. NotePad++ (Windows)
10. BlueFish (Linux)



Atom



- Atom :
  - One of the most important **IDLE** for python and it's great for connecting to **Github**
  - **IDLE : I**ntegrated **D**eve**L**opment **E**nvironment (IDLE)



Thanks