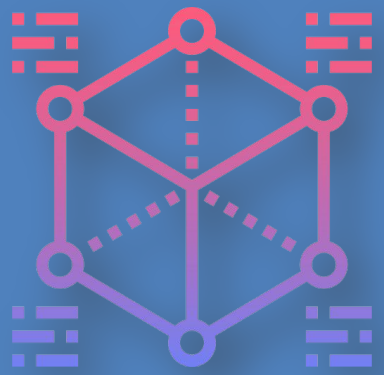
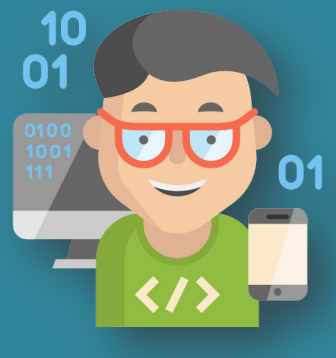




greatlearning

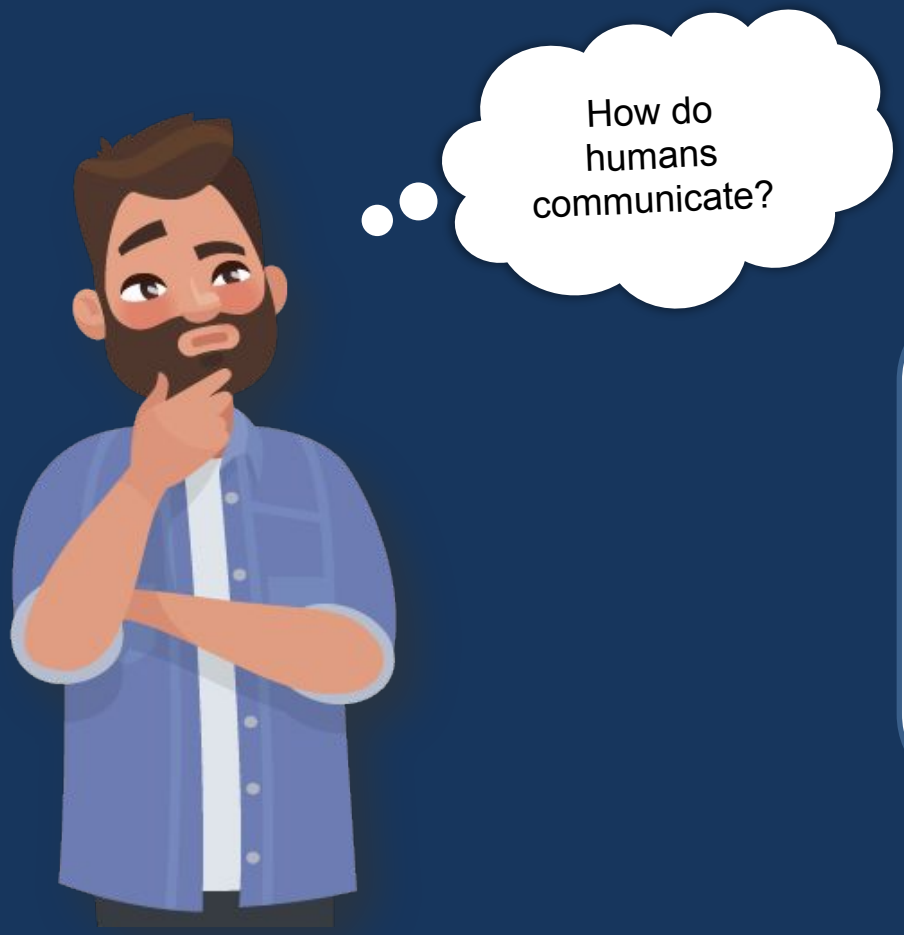
Power Ahead

Python for Non-Programmers

Agenda

1. Installing Python
2. Python Basics
3. Data Structures in Python
4. Python Functions
5. Object Oriented Programming

How do Humans Communicate?



hello

Olá

Bonjour

नमस्कार

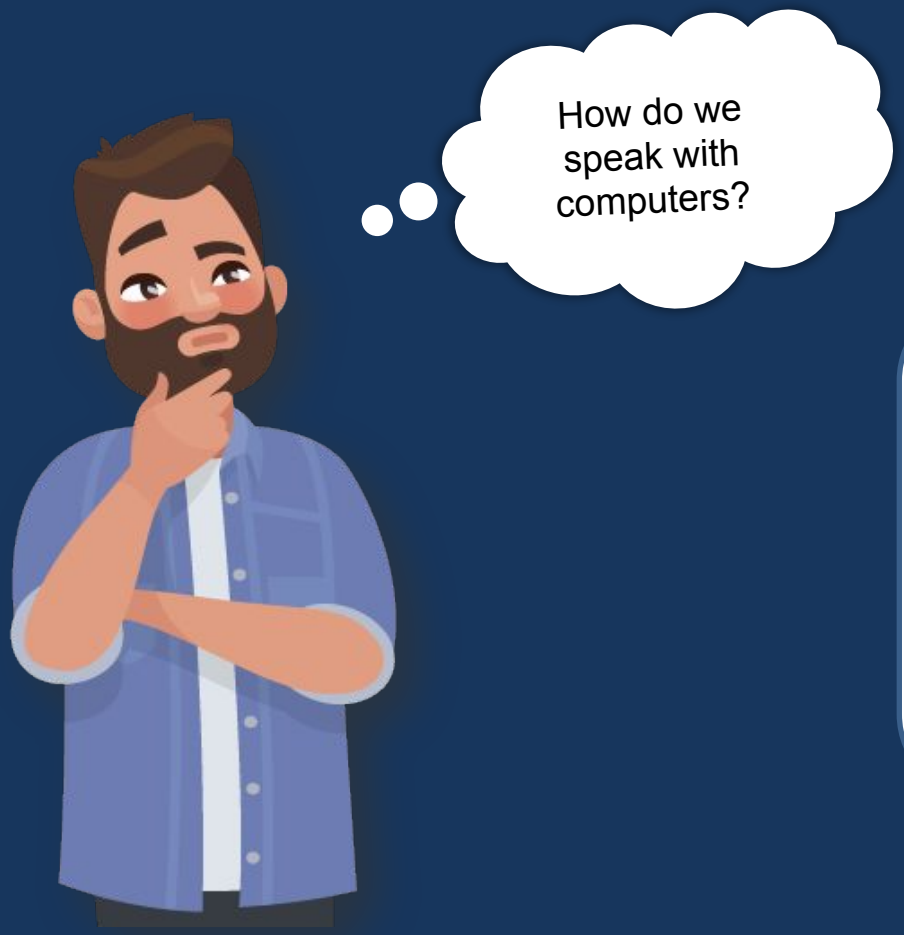
Grammar in Language

Every Language has Grammar associated with it

I am Sam

Am Sam I

Language for Computers



Java

Python

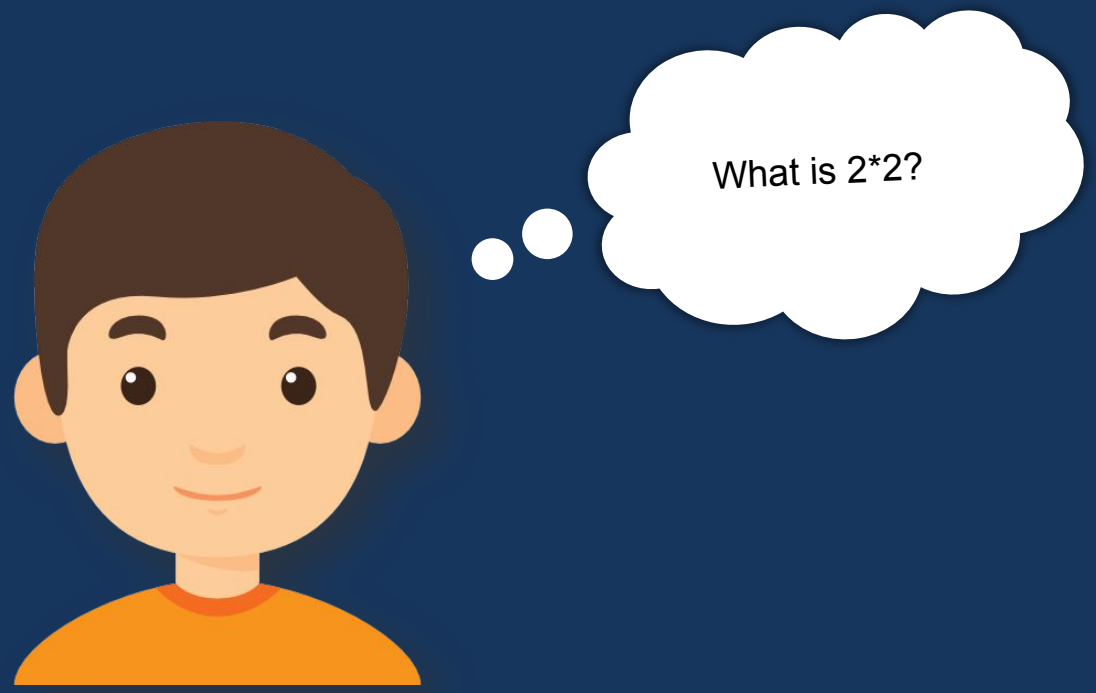
C++

Syntax for Computer Language

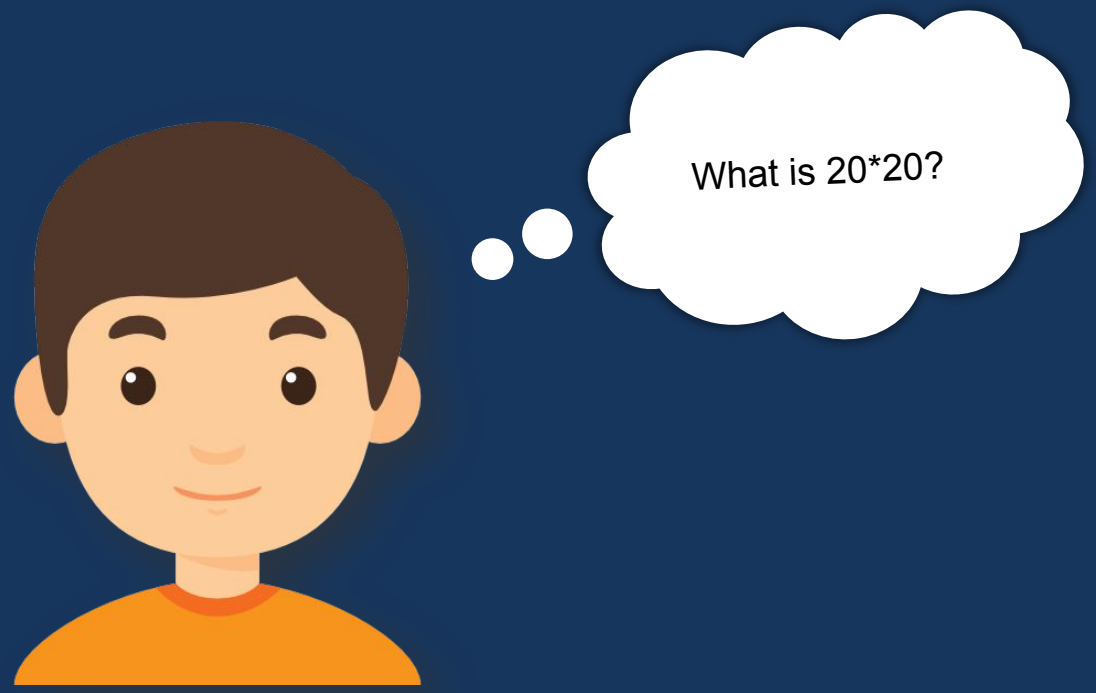
import pandas as pd

pandas import pd as

Why do we need Programming?



Why do we need Programming?



Why do we need Programming?

Applications of Programming Languages

Gaming

Banking

Machine Learning

What is Data?

13.4

287

My Name is Sam

$(a+b)^2$

0 1

How to Store Data?

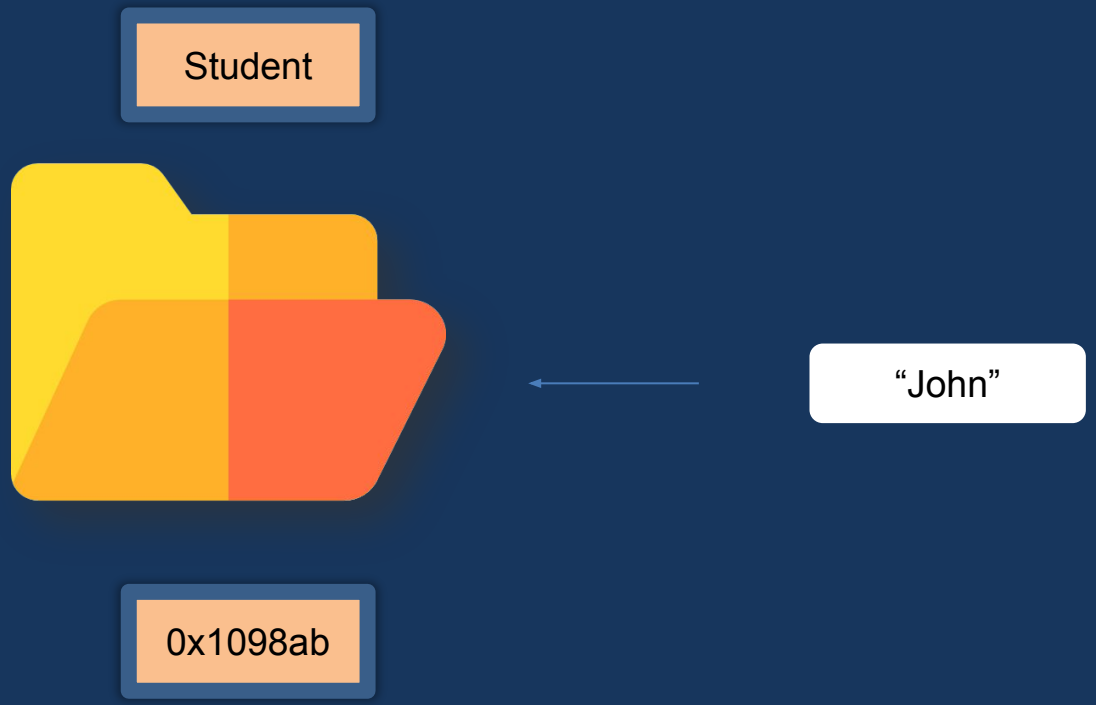
"John"

123

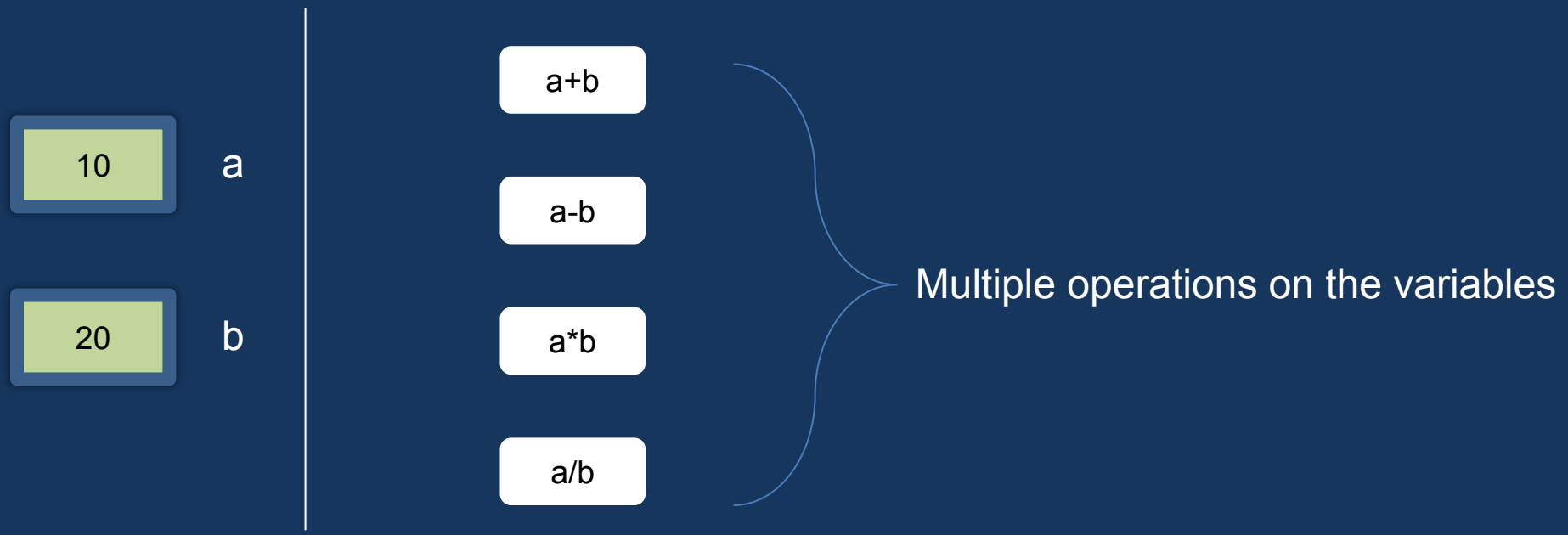
TRUE

Need of Variables

Data/Values can be stored in temporary storage spaces called variables



Example of Variable



Decision Making Statements

If
It’s raining:
Sit inside

else
Go out and Play Football

Decision Making Statements

If
Marks > 70:
Get Ice-cream

else
Give Practice Test

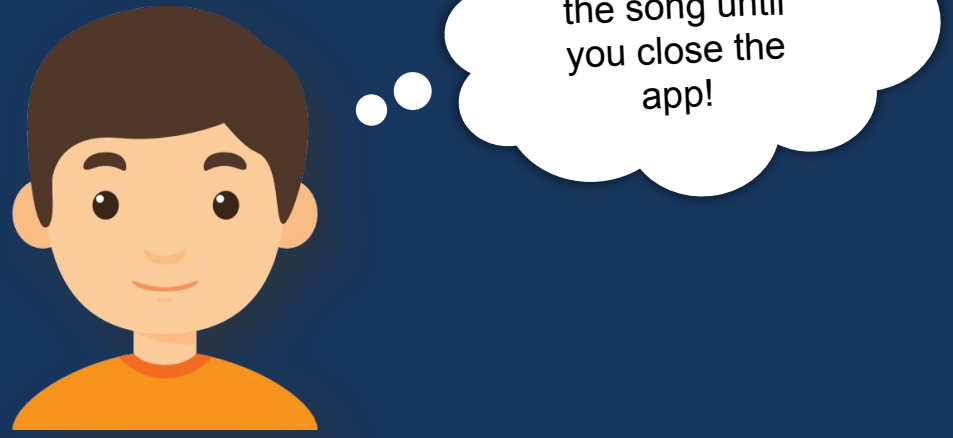
if…else Pseudo Code

```
If(condition){
Statements to be executed….
}

else{
Statements to be executed….
}
```

Looping Statements

Looping statements are used to repeat a task multiple times

Looping Statements



Looping Statements

While Loop Pseudo Code

```
while(TRUE){
Keep executing statements….
}
```

Functions in Real Life

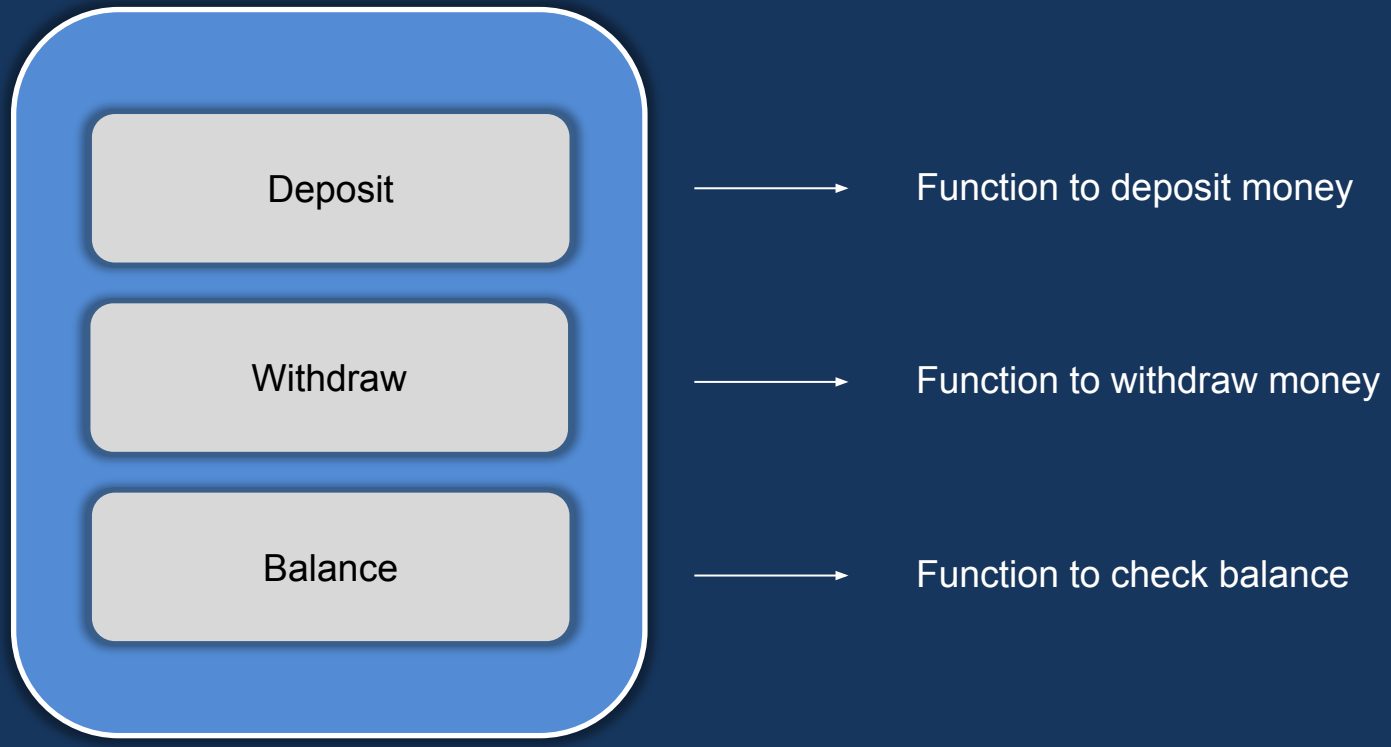
Eating

Running

Cycling

Functions in Programming World

Function is a block of code which performs a specific task



Object Oriented Programming

Classes

Class is a template/blue-print for real-world entities

Properties

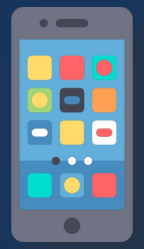
- Color
- Cost
- Battery Life

Behavior

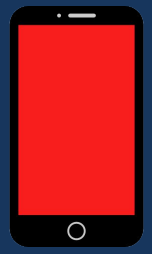
- Make Calls
- Watch Videos
- Play Games

Objects

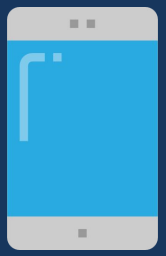
Objects are specific instances of a class



Apple



Motorola



Samsung

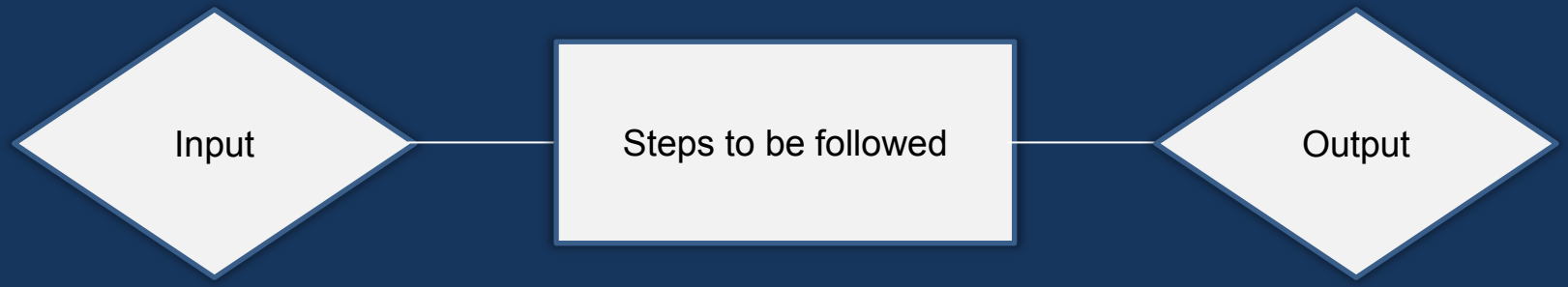
How do you solve a problem?

Step by Step Approach

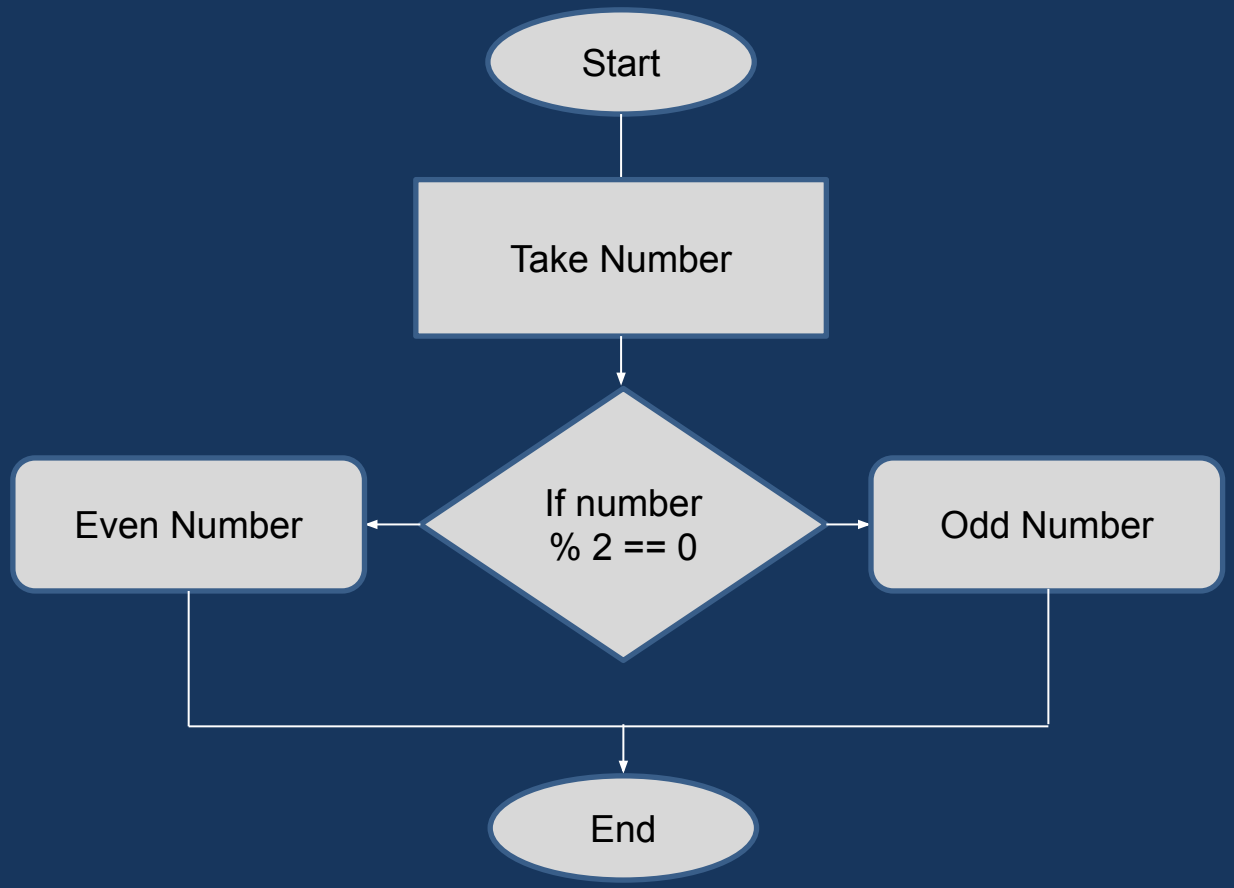
1. Check if you have all the ingredients
2. Take lemon and cut into two halves
3. Squeeze lemon into a glass of water
4. Add sugar and stir it well
5. Serve it cold with ice cubes

What is an Algorithm?

Step by step approach to solve a problem is known as algorithm



Algorithm to find if number is even/odd



Introduction to Python

Cross-Platform Compatible

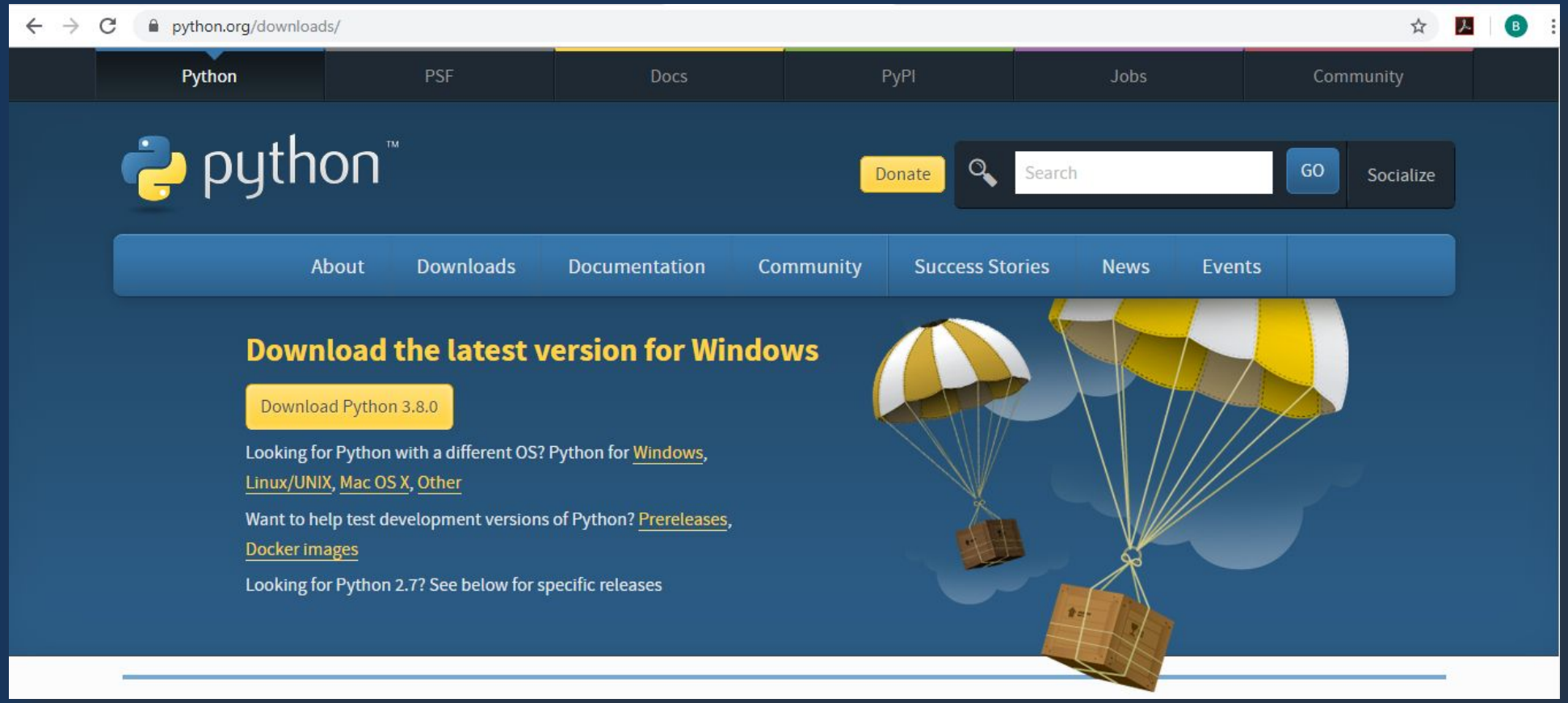
Free & Open Source

Large Standard Library

Object Oriented

Installing Python

This is the site to install Python ->

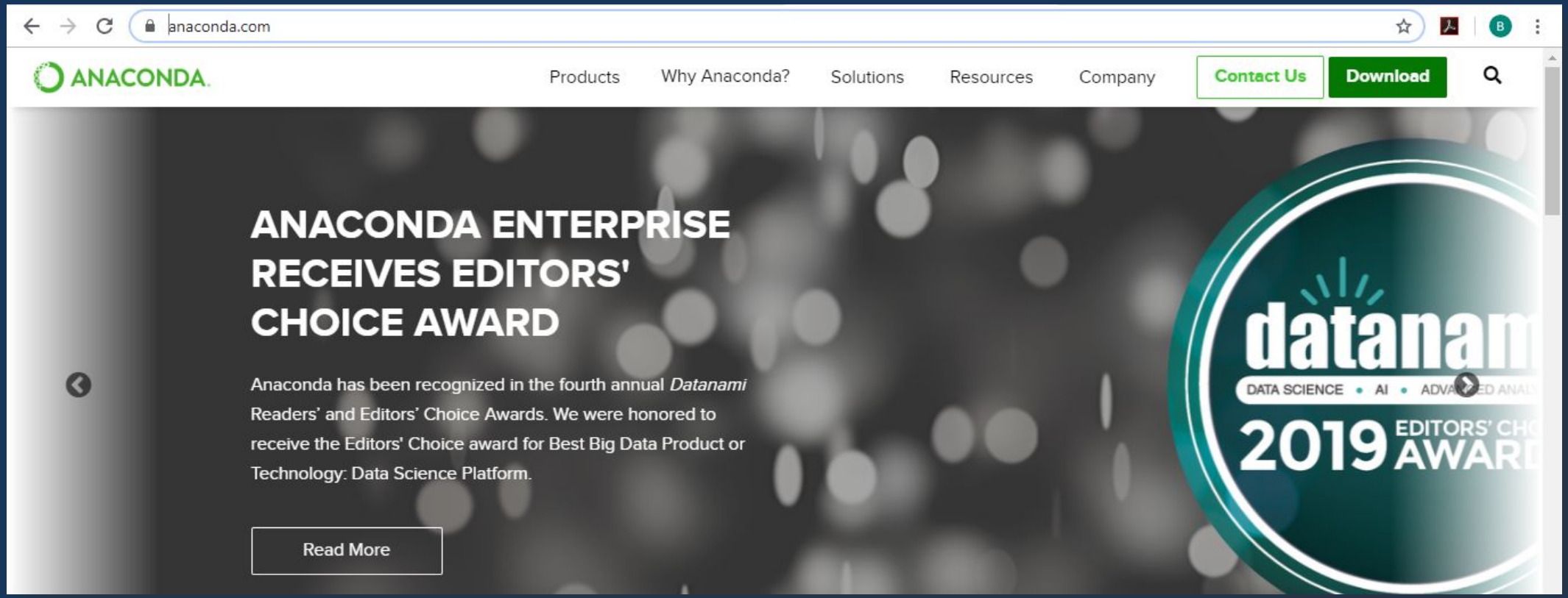


Installing PyCharm

This is the site to install PyCharm ->

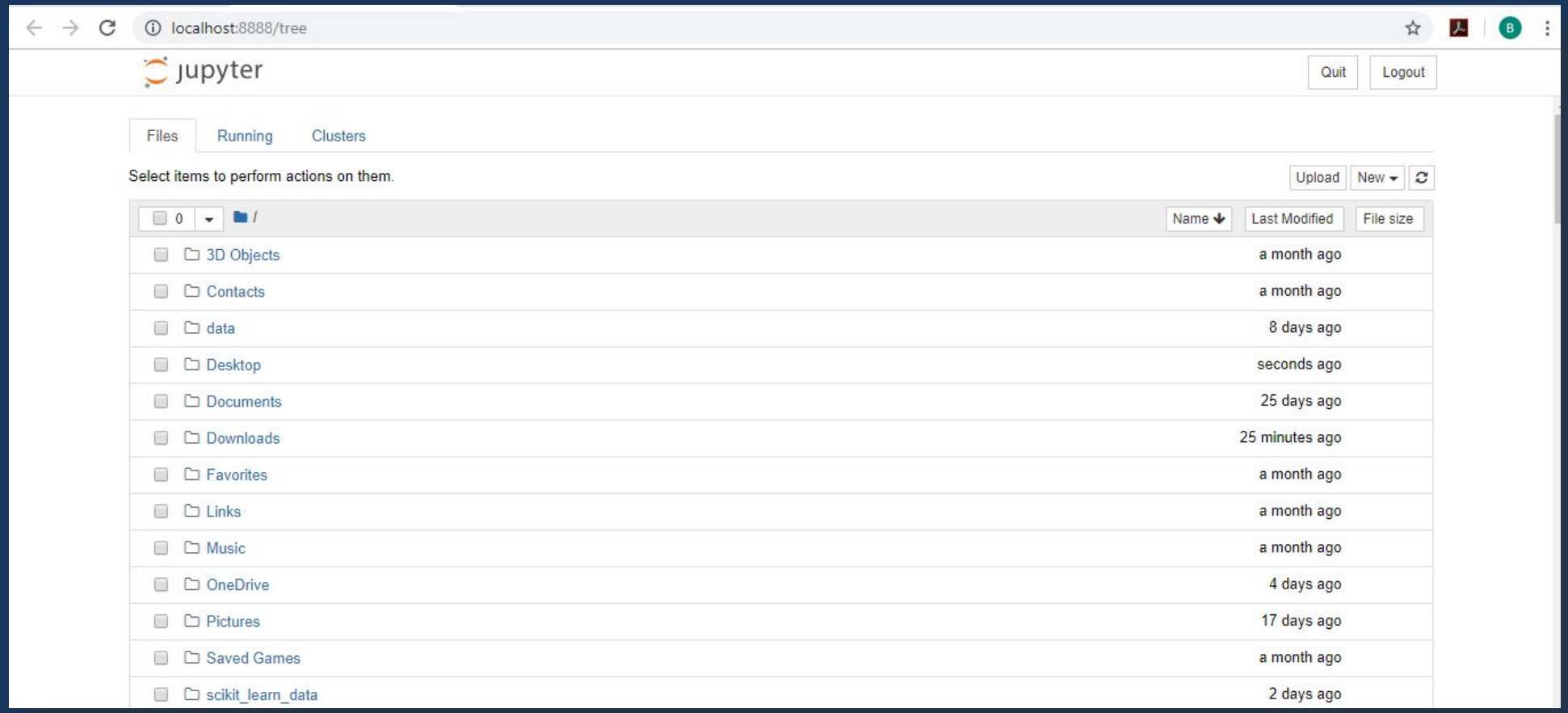
Installing Anaconda

This is the site to install Anaconda ->



Intro to Jupyter Notebook

Jupyter Notebook is a browser-based interpreter that allows us to interactively work with Python



Variables in Python

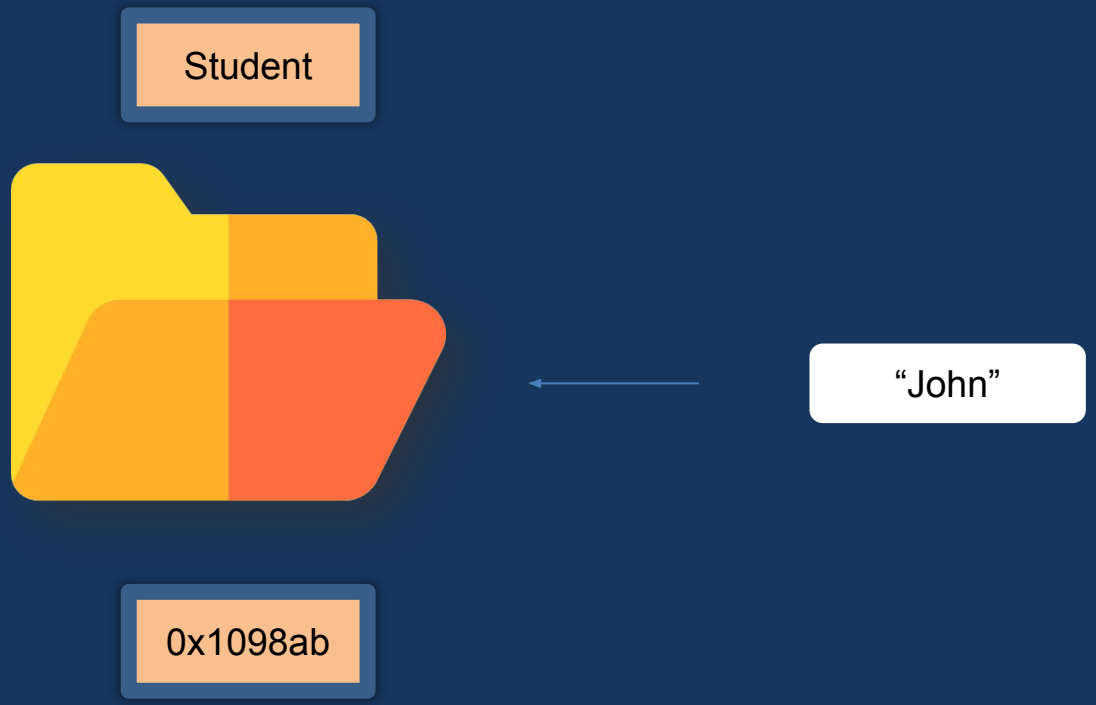
“John”

“Sam”

“Matt”

Variables in Python

Data/Values can be stored in temporary storage spaces called variables



Variables in Python

Data/Values can be stored in temporary storage spaces called variables

DataTypes in Python

Every variable is associated with a data-type

10, 500	3.14, 15.97	TRUE, FALSE	“Sam”, “Matt”
int	float	Boolean	String

Operators in Python

Arithmetic Operators

Relational Operators

Logical Operators

Python Tokens

Smallest meaningful Component in a Program

- Keywords
- Identifiers
- Literals
- Operators

Python Keywords

Keywords are special reserved words

False	class	Finally	Is	Return
None	continue	For	Lambda	Try
True	def	From	Nonlocal	While
and	del	Global	Not	With
as	elif	If	Or	Yield

Python Identifiers

Identifiers are names used for variables, functions or objects

Rules

- No special character expect _(underscore)
- Identifiers are case sensitive
- First Letter cannot be a digit

Python Literals

Literals are constants in Python

Python Strings

Strings are sequence of characters enclosed within single quotes(‘ ’), double quotes(“ “) or triple quotes(“’ “’)

‘Hello World’

“This is Sparta”

“’ I am going to
France tomorrow”’

Extracting Individual Characters

```
In [23]: my_string="My name is John"

In [24]: my_string[0]
Out[24]: 'M'
```

```
In [5]: my_string="My name is John"

In [6]: my_string[-1]
Out[6]: 'n'
```

String Functions

Finding length of string

```
In [28]: len(my_string)
Out[28]: 15
```

Converting String to lower case

```
In [30]: my_string.lower()
Out[30]: 'my name is john'
```

Converting String to upper case

```
In [31]: my_string.upper()
Out[31]: 'MY NAME IS JOHN'
```

String Functions

Replacing a substring

```
In [33]: my_string.replace('y','a')
Out[33]: 'Ma name is John'
```

Number of occurrences of substring

```
In [7]: new_string = "hello hello world"

In [8]: new_string.count("hello")
Out[8]: 2
```

String Functions

Finding the index of substring

```
In [13]: s1 = 'This is sparta!!!'
         s1.find('sparta')

Out[13]: 8
```

Splitting a String

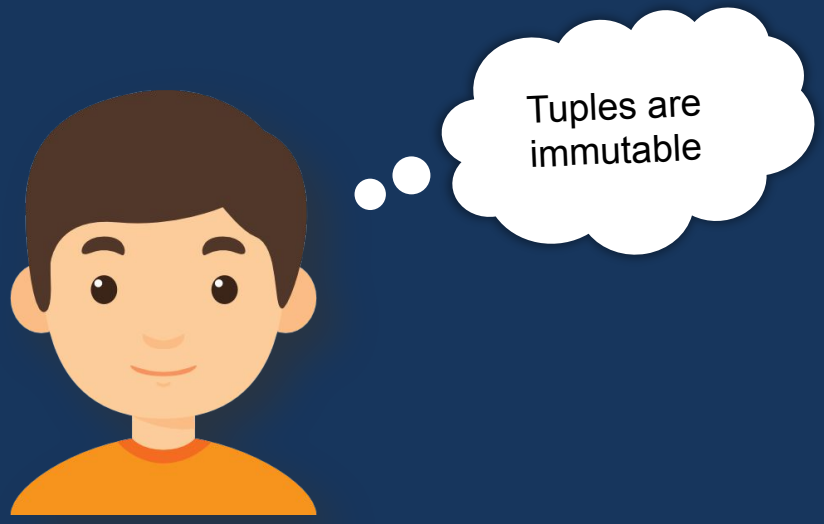
```
In [15]: fruit = 'I like apples, mangoes, bananas'

         fruit.split(',')

Out[15]: ['I like apples', ' mangoes', ' bananas']
```

Data-Structures in Python

- Tuple
- List
- Dictionary
- Set

Tuple in Python

Tuple is an ordered collection of elements enclosed within ()




```
tup1=(1,'a',True)
```

Extracting Individual Elements

```
In [20]: tup1=(1,"a",True,2,"b",False)
         tup1[0]

Out[20]: 1
```

```
In [21]: tup1=(1,"a",True,2,"b",False)
         tup1[-1]

Out[21]: False
```

```
In [22]: tup1=(1,"a",True,2,"b",False)
         tup1[1:4]

Out[22]: ('a', True, 2)
```

Modifying a Tuple

You cannot modify a tuple because it is immutable

```
In [49]: tup1[2]="hello"
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-49-2fc16622751e> in <module>
----> 1 tup1[2]="hello"

TypeError: 'tuple' object does not support item assignment
```

Tuple Basic Operations

Finding Length of Tuple

```
In [24]: tup1=(1,"a",True,2,"b",False)
         len(tup1)

Out[24]: 6
```

Concatenating Tuples

```
In [25]: tup1 = (1,2,3)
         tup2 = (4,5,6)
         tup1+tup2

Out[25]: (1, 2, 3, 4, 5, 6)
```

Tuple Basic Operations

Repeating Tuple Elements

```
In [29]: tup1 = ('sparta',300)
         tup1*3

Out[29]: ('sparta', 300, 'sparta', 300, 'sparta', 300)
```

Repeating and Concatenating

```
In [31]: tup1 = ('sparta',300)
         tup2 = (4,5,6)
         tup1*3 + tup2

Out[31]: ('sparta', 300, 'sparta', 300, 'sparta', 300, 4, 5, 6)
```

Tuple Functions

Minimum Value

```
In [32]: tup1=(1,2,3,4,5)
         min(tup1)

Out[32]: 1
```

Maximum Value

```
In [33]: tup1=(1,2,3,4,5)
         max(tup1)

Out[33]: 5
```

List in Python

List is an ordered collection of elements enclosed within []


```
l1=[1,'a',True]
```

Extracting Individual Elements

```
In [58]: l1=[1,"a",2,"b",3,"c"]
         l1[1]

Out[58]: 'a'
```

```
In [59]: l1=[1,"a",2,"b",3,"c"]
         l1[2:5]

Out[59]: [2, 'b', 3]
```

Modifying a List

Changing the element at 0th index

```
In [35]: l1=[1,"a",2,"b",3,"c"]
         l1[0]=100
         l1

Out[35]: [100, 'a', 2, 'b', 3, 'c']
```

Popping the last element

```
In [37]: l1=[1,"a",2,"b",3,"c"]
         l1.pop()
         l1

Out[37]: [1, 'a', 2, 'b', 3]
```

Appending a new element

```
In [36]: l1=[1,"a",2,"b",3,"c"]
         l1.append("Sparta")
         l1

Out[36]: [1, 'a', 2, 'b', 3, 'c', 'Sparta']
```

Modifying a List

Reversing elements of a list

```
In [40]: l1=[1,"a",2,"b",3,"c"]
         l1.reverse()
         l1

Out[40]: ['c', 3, 'b', 2, 'a', 1]
```

Inserting element at a specified index

```
In [41]: l1=[1,"a",2,"b",3,"c"]
         l1.insert(1,"Sparta")
         l1

Out[41]: [1, 'Sparta', 'a', 2, 'b', 3, 'c']
```

Sorting a list

```
In [43]: l1 = ["mango","banana","guava","apple"]
         l1.sort()
         l1

Out[43]: ['apple', 'banana', 'guava', 'mango']
```

List Basic Operations

Concatenating Lists

```
In [44]: l1 = [1,2,3]
         l2 = ["a","b","c"]
         l1+l2

Out[44]: [1, 2, 3, 'a', 'b', 'c']
```

Repeating elements

```
In [45]: l1 = [1,"a",True]
         l1*3

Out[45]: [1, 'a', True, 1, 'a', True, 1, 'a', True]
```

Dictionary in Python

Dictionary is an unordered collection of key-value pairs enclosed with {}


```
Fruit={"Apple":10,"Orange":20}
```

Extracting Keys and Values

Extracting Keys

```
In [1]: fruit={"Apple":10,"Orange":20,"Banana":30,"Guava":40}
        fruit.keys()

Out[1]: dict_keys(['Apple', 'Orange', 'Banana', 'Guava'])
```

Extracting Values

```
In [70]: fruit={"Apple":10,"Orange":20,"Banana":30,"Guava":40}
         fruit.values()

Out[70]: dict_values([10, 20, 30, 40])
```

Modifying a Dictionary

Adding a new element

```
In [2]: fruit={"Apple":10,"Orange":20,"Banana":30,"Guava":40}
        fruit["Mango"]=50
        fruit

Out[2]: {'Apple': 10, 'Orange': 20, 'Banana': 30, 'Guava': 40, 'Mango': 50}
```

Changing an existing element

```
In [3]: fruit={"Apple":10,"Orange":20,"Banana":30,"Guava":40,"Mango":50}
        fruit["Apple"]=100
        fruit

Out[3]: {'Apple': 100, 'Orange': 20, 'Banana': 30, 'Guava': 40, 'Mango': 50}
```

Dictionary Functions

Update one dictionary's elements with another

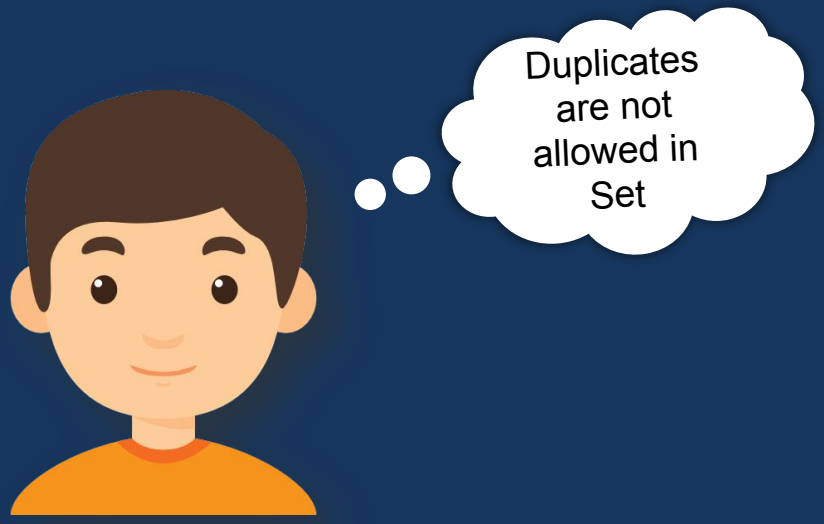
```
In [4]: fruit1={"Apple":10,"Orange":20}
        fruit2={"Banana":30,"Guava":40}

        fruit1.update(fruit2)

        fruit1

Out[4]: {'Apple': 10, 'Orange': 20, 'Banana': 30, 'Guava': 40}
```

Popping an element

```
In [6]: fruit={"Apple":10,"Orange":20,"Banana":30,"Guava":40}
        fruit.pop("Orange")
        fruit

Out[6]: {'Apple': 10, 'Banana': 30, 'Guava': 40}
```

Set in Python

Set is an unordered and unindexed collection of elements enclosed with {}




```
s1={1,"a",True}
```

Set Operations

Update one dictionary's elements with another

```
In [7]: s1={1,"a",True,2,"b",False}
        s1.add("Hello")
        s1

Out[7]: {1, 2, False, 'Hello', 'a', 'b'}
```

Removing an element

```
In [9]: s1={1,"a",True,2,"b",False}
        s1.remove("b")
        s1

Out[9]: {1, 2, False, 'a'}
```

Updating multiple elements

```
In [8]: s1={1,"a",True,2,"b",False}
        s1.update([10,20,30])
        s1

Out[8]: {1, 10, 2, 20, 30, False, 'a', 'b'}
```

Set Functions

Union of two sets

```
In [11]: s1 = {1,2,3}
         s2 = {"a","b","c"}

         s1.union(s2)

Out[11]: {1, 2, 3, 'a', 'b', 'c'}
```

Intersection of two sets

```
In [13]: s1 = {1,2,3,4,5,6}
         s2 = {5,6,7,8,9}

         s1.intersection(s2)

Out[13]: {5, 6}
```

If Statement

If
It’s raining:
Sit inside

else
Go out and Play Football

If Statement

If
Marks > 70:
Get Ice-cream

else
Give Practice Test

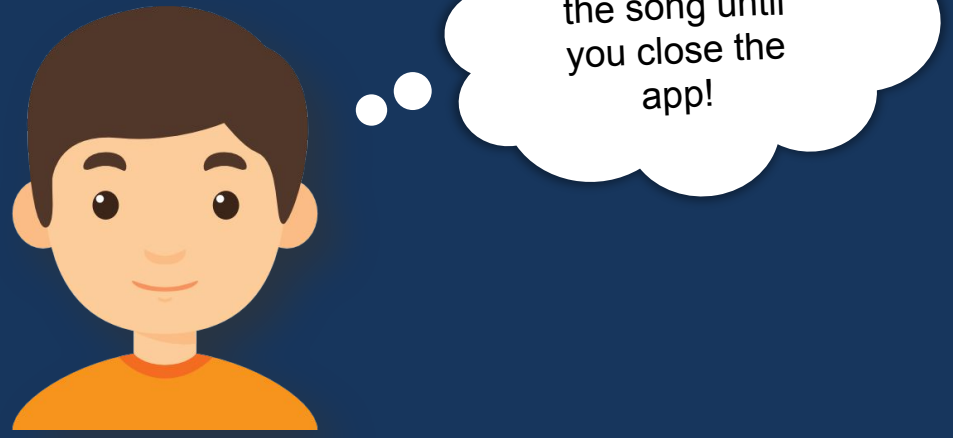
if…else Pseudo Code

```
If(condition){
Statements to be executed….
}

else{
Statements to be executed….
}
```

Looping Statements

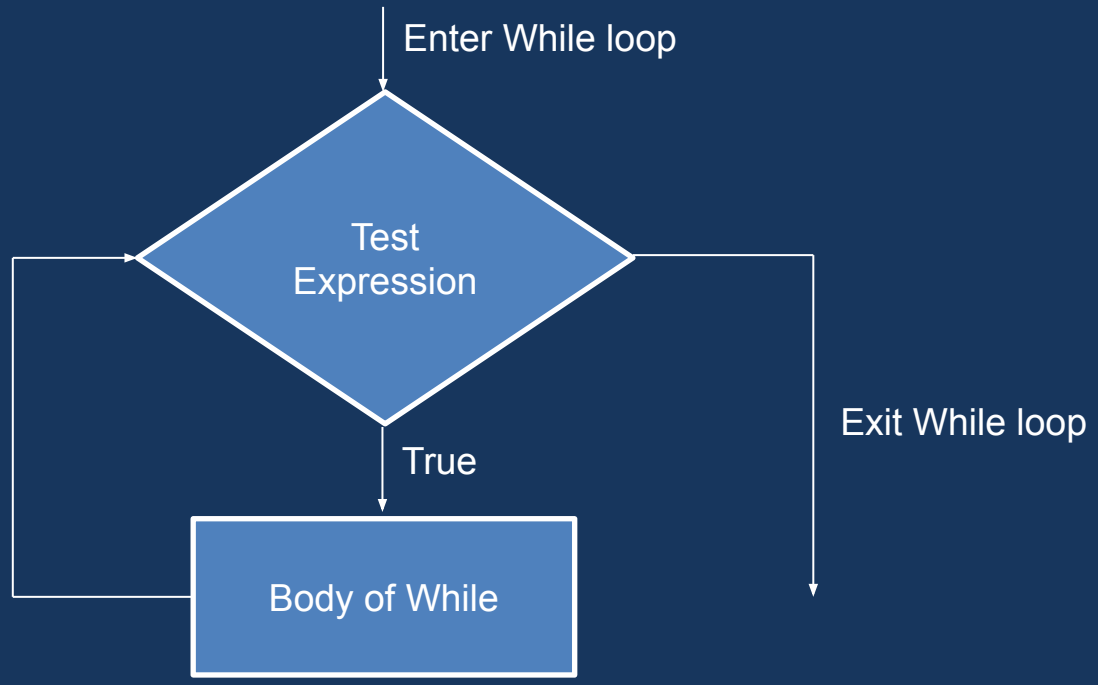
Looping statements are used to repeat a task multiple times

Looping Statements



Looping Statements

While Loop

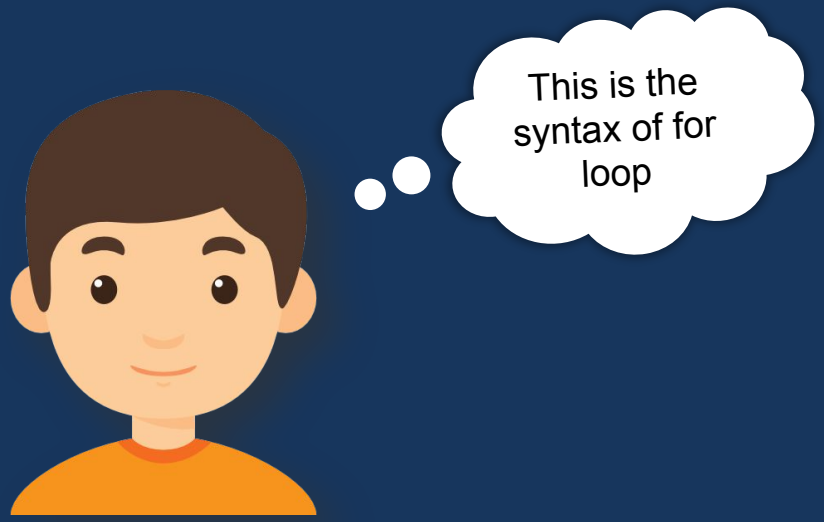


Syntax:

while condition:
    Execute Statements

For Loop

For Loop is used to iterate over a sequence(tuple, list, dictionary..)




```
for val in sequence:
    Body of for
```

Functions in Real Life

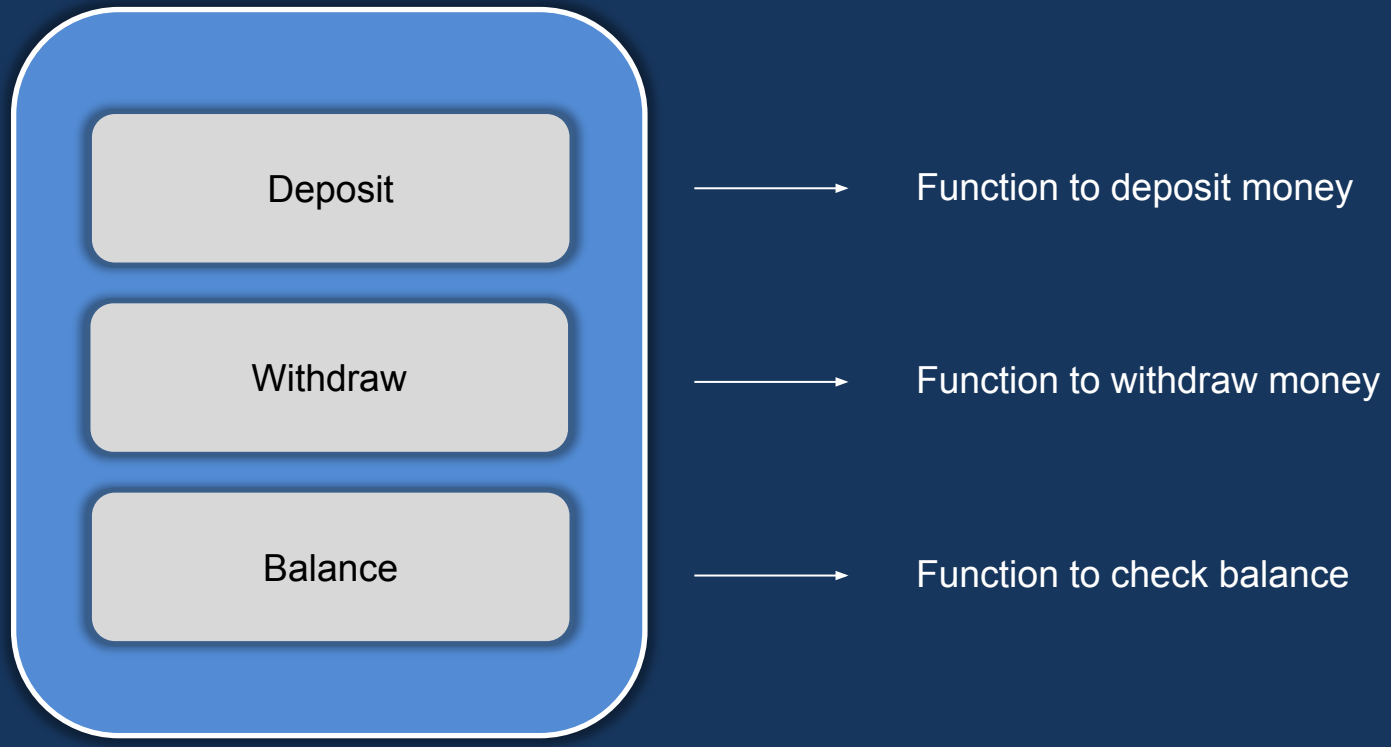
Eating

Running

Cycling

Python Functions

Function is a block of code which performs a specific task



Python Object Oriented Programming

Classes

Class is a template/blue-print for real-world entities

Properties

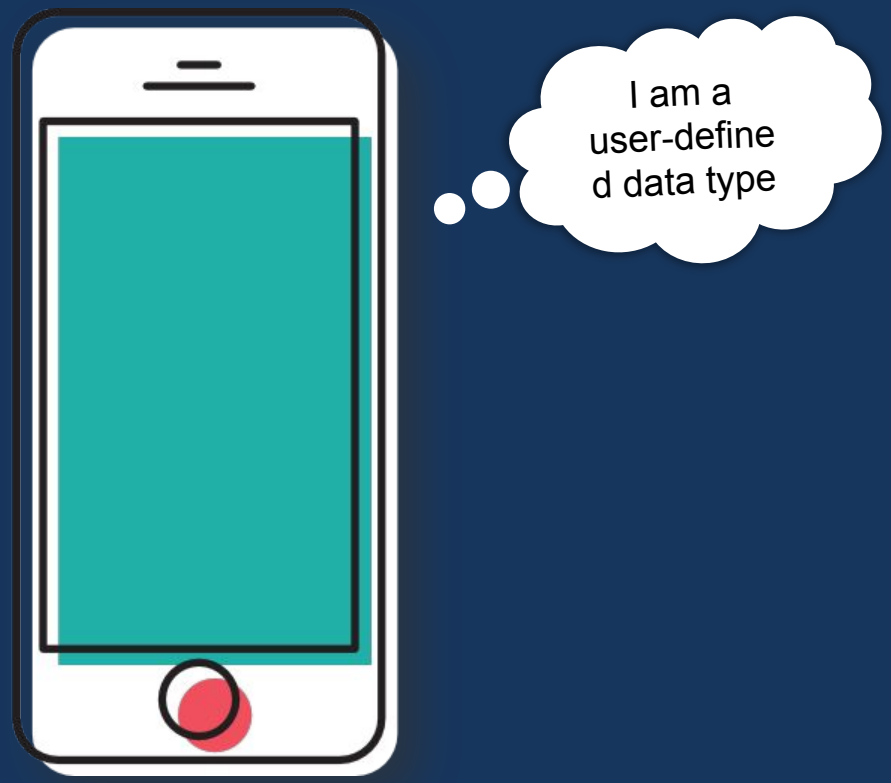
- Color
- Cost
- Battery Life

Behavior

- Make Calls
- Watch Videos
- Play Games

Class in Python

Class is a user-defined data-type



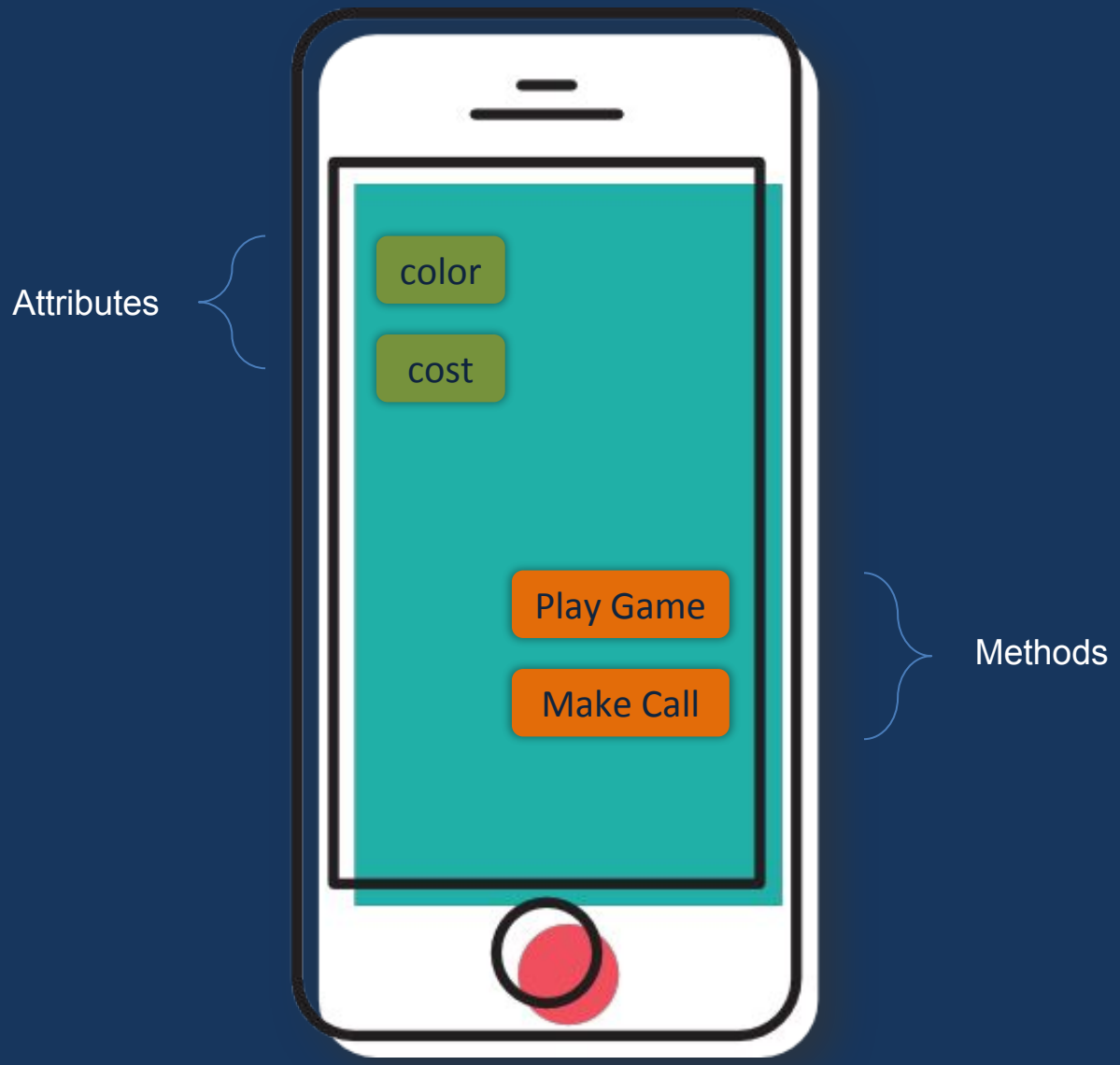
int

float

bool

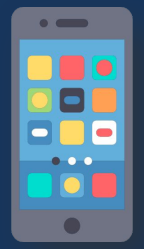
str

Attributes and Methods

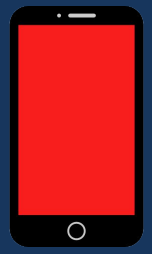


Objects

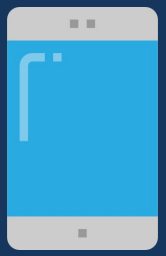
Objects are specific instances of a class



Apple



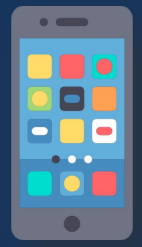
Motorola

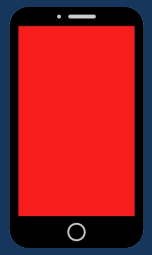


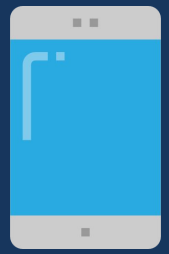
Samsung

Objects in Python

Specific instances of Mobile data type







Apple

Motorola

Samsung

---

a = 10

b = 20

c = 30

Specific instances of integer data type

Creating the first Class

```
In [1]: class Phone:

            def make_call(self):
                print("Making phone call")

            def play_game(self):
                print("Playing Game")
```

Creating the ‘Phone’ class

```
In [38]: p1=Phone()
```

Instantiating the ‘p1’ object

```
In [39]: p1.make_call()
         Making phone call

In [40]: p1.play_game()
         Playing Game
```

Invoking methods through object

Adding parameters to the class

```
In [42]: class Phone:

             def set_color(self,color):
                 self.color=color

             def set_cost(self,cost):
                 self.cost=cost

             def show_color(self):
                 return self.color

             def show_cost(self):
                 return self.cost

             def make_call(self):
                 print("Making phone call")

             def play_game(self):
                 print("Playing Game")
```

Setting and Returning the attribute values

Creating a class with Constructor

```
In [4]: class Employee:
            def __init__(self,name,age, salary,gender):

                self.name = name
                self.age = age
                self.salary =  salary
                self.gender = gender

            def employee_details(self):
                print("Name of employee is ",self.name)
                print("Age of employee is ",self.age)
                print("Salary of employee is ",self.salary)
                print("Gender of employee is ",self.gender)
```

init method acts as the constructor

Instantiating Object

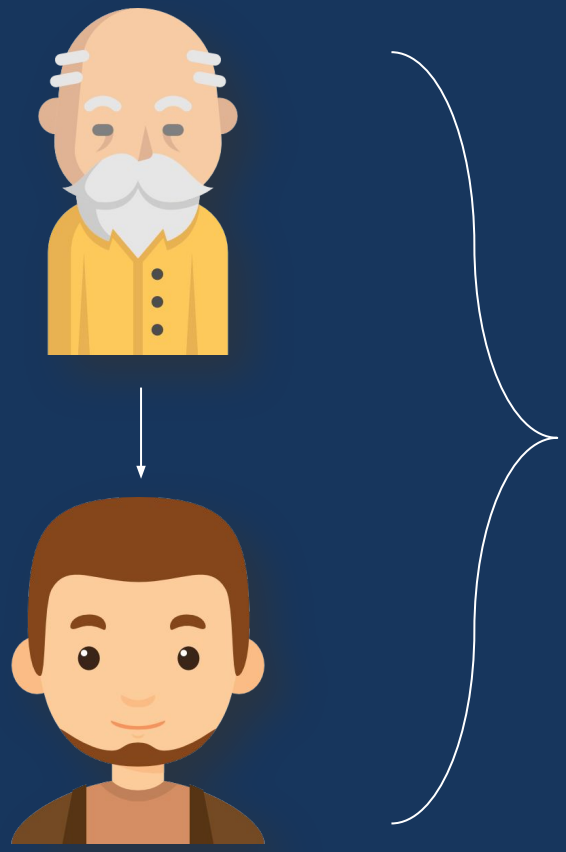
Instantiating the ‘e1’ object

Invoking the ‘employee_details’ method

```
In [5]: e1 = Employee('Sam',32,85000,'Male')

In [6]: e1.employee_details()
        Name of employee is  Sam
        Age of employee is  32
        Salary of employee is  85000
        Gender of employee is  Male
```

Inheritance in Python

With inheritance one class can derive the properties of another class



Man inheriting features from his father

Inheritance Example

```
In [23]: class Vehicle:

             def __init__(self,mileage, cost):
                 self.mileage = mileage
                 self.cost = cost

             def show_details(self):
                 print("I am a Vehicle")
                 print("Mileage of Vehicle is ", self.mileage)
                 print("Cost of Vehicle is ", self.cost)
```

Creating the base class

```
In [24]: v1 = Vehicle(500,500)
         v1.show_details()

         I am a Vehicle
         Mileage of Vehicle is  500
         Cost of Vehicle is  500
```

Instantiating the object for base class

Inheritance Example

```
In [25]: class Car(Vehicle):
             def show_car(self):
                 print("I am a car")
```

Creating the child class

```
In [26]: c1 = Car(200,1200)

In [27]: c1.show_details()

         I am a Vehicle
         Mileage of Vehicle is  200
         Cost of Vehicle is  1200
```

Instantiating the object for child class

```
In [28]: c1.show_car()

         I am a car
```

Invoking the child class method

Over-riding init method

```
In [9]: class Car(Vehicle):

            def __init__(self,mileage,cost,tyres,hp):
                super().__init__(mileage,cost)
                self.tyres = tyres
                self.hp =hp

            def show_car_details(self):
                print("I am a car")
                print("Number of tyres are ",self.tyres)
                print("Value of horse power is ",self.hp)
```

Over-riding init method

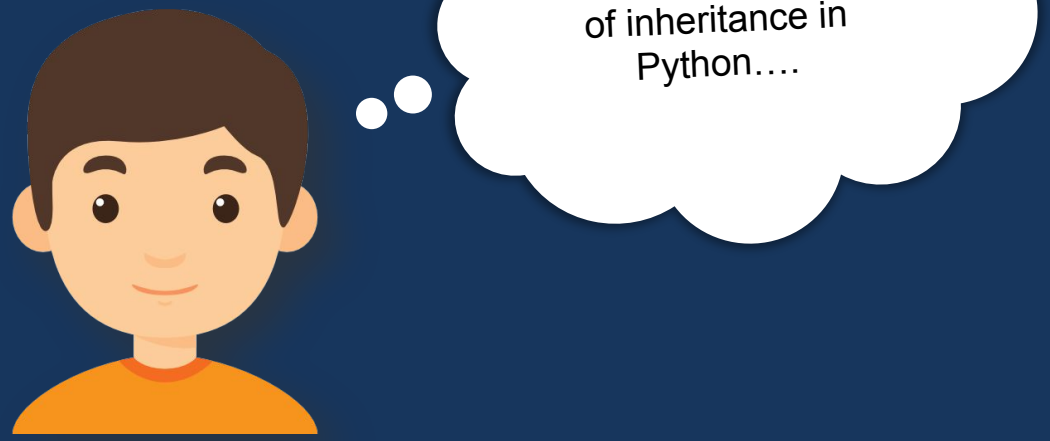
Invoking show_details() method from parent class

```
In [10]: c1 = Car(20,12000,4,300)

In [11]: c1.show_details()

         I am a Vehicle
         Mileage of Vehicle is  20
         Cost of Vehicle is  12000
```

Invoking show_car_details() method from child class

```
In [12]: c1.show_car_details()

         I am a car
         Number of tyres are  4
         Value of horse power is  300
```

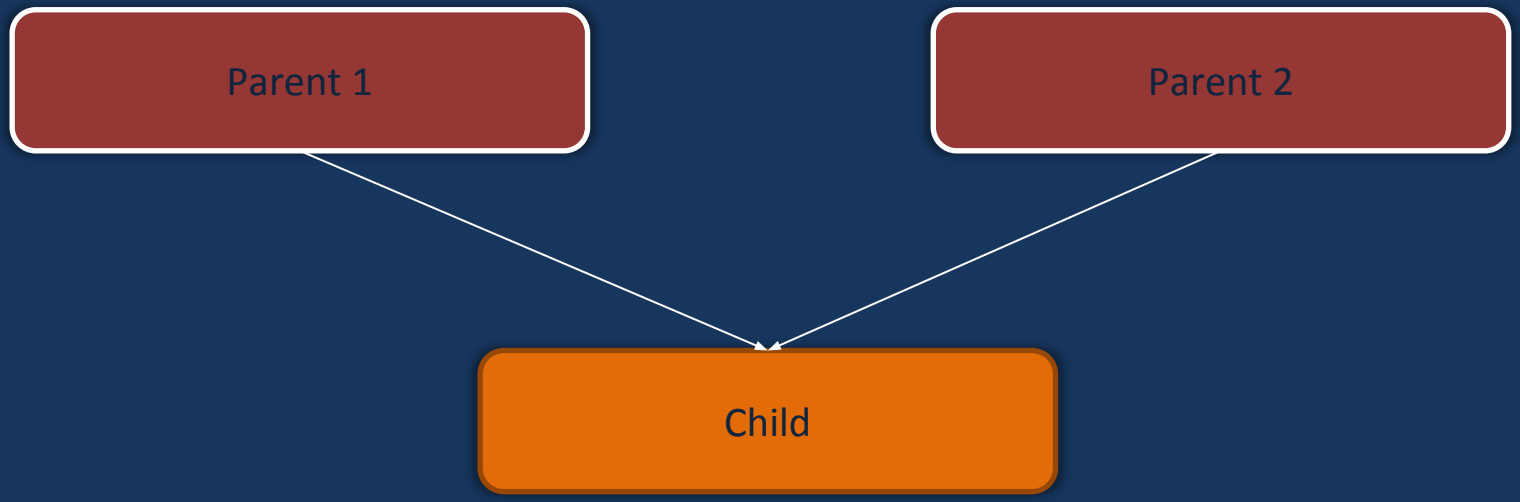
Types of Inheritance



- Single Inheritance
- Multiple Inheritance
- Multi-level Inheritance
- Hybrid Inheritance

Multiple Inheritance

In multiple inheritance, the child inherits from more than 1 parent class



Multiple Inheritance in Python

Parent Class One

```
In [35]: class Parent1():
             def assign_string_one(self,str1):
                 self.str1 = str1

             def show_string_one(self):
                 return self.str1
```

Parent Class Two

```
In [36]: class Parent2():
             def assign_string_two(self,str2):
                 self.str2 = str2

             def show_string_two(self):
                 return self.str2
```

Child Class

```
In [40]: class Derived(Parent1, Parent2):
             def assign_string_three(self,str3):
                 self.str3=str3

             def show_string_three(self):
                 return self.str3
```

Multiple Inheritance in Python

Instantiating object of child class

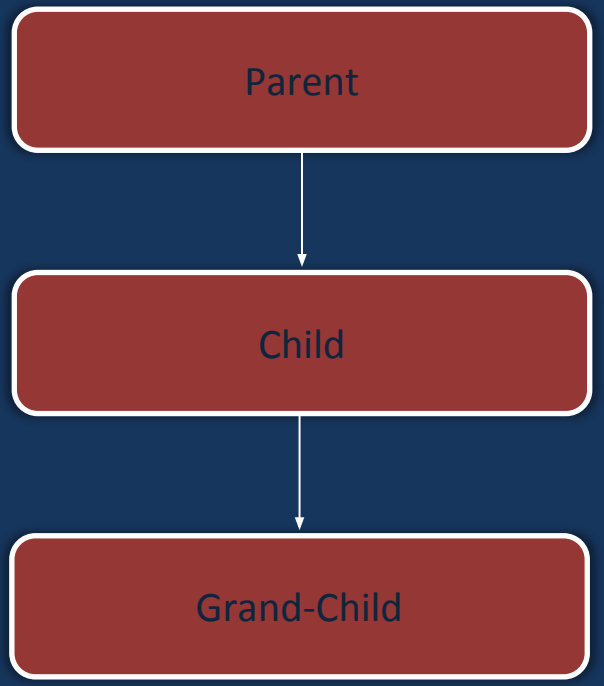
```
In [41]: d1 = Derived()

In [42]: d1.assign_string_one("one")
         d1.assign_string_two("two")
         d1.assign_string_three("three")
```

Invoking methods

```
In [46]: d1.show_string_one()
Out[46]: 'one'

In [47]: d1.show_string_two()
Out[47]: 'two'

In [48]: d1.show_string_three()
Out[48]: 'three'
```

Multi-Level Inheritance

In multi-level Inheritance, we have Parent, child, grand-child relationship



Multi-Level Inheritance in Python

Parent Class

```
In [52]: class Parent():
             def assign_name(self,name):
                 self.name = name

             def show_name(self):
                 return self.name
```

Child Class

```
In [53]: class Child(Parent):
             def assign_age(self,age):
                 self.age = age

             def show_age(self):
                 return self.age
```

Grand-Child Class

```
In [54]: class GrandChild(Child):
             def assign_gender(self,gender):
                 self.gender = gender

             def show_gender(self):
                 return self.name
```

Multi-Level Inheritance in Python

Instantiating object of GrandChild class

```
In [55]: g1 = GrandChild()

In [56]: g1.assign_name("Sam")
         g1.assign_age(25)
         g1.assign_gender("Male")
```

Invoking class methods

```
In [57]: g1.show_name()
Out[57]: 'Sam'

In [58]: g1.show_age()
Out[58]: 25

In [59]: g1.show_gender()
Out[59]: 'Sam'
```