Functions & Memory in Python 🐍

Lecture

id() function

What happens when you write?

```python
x = 10
y = 10

print(id(x))
print(id(y))
```

Both 'x' and 'y' refer to same object.

```python
x = 10
y = 10

print(id(x))
print(id(y))
```

- A Python program accesses data values through references. A *reference* is a name that refers to the specific location in memory of a value (object). The object to which a reference is bound at a given time does have a type, however. Any given reference may be bound to objects of different types during the execution of a program.

- Python optimises memory utilisation by allocating the same object reference to a new variable if object has same value.

Everything is a object in Python

Functions

Functions

A Function is a block of code which only runs when it is called.

You can pass data, known as parameters, into a function.

Example 👨‍💻

```python
def sayHello():
	print("hello world")


sayHello()
```

Data can be passed to functions using one or more parameters. Parameters can have default values.

Functions can also return objects

Why Create Methods.

- Methods increase the reusability of code.
- Code looks more modular & organised.

Problems-I 🚀

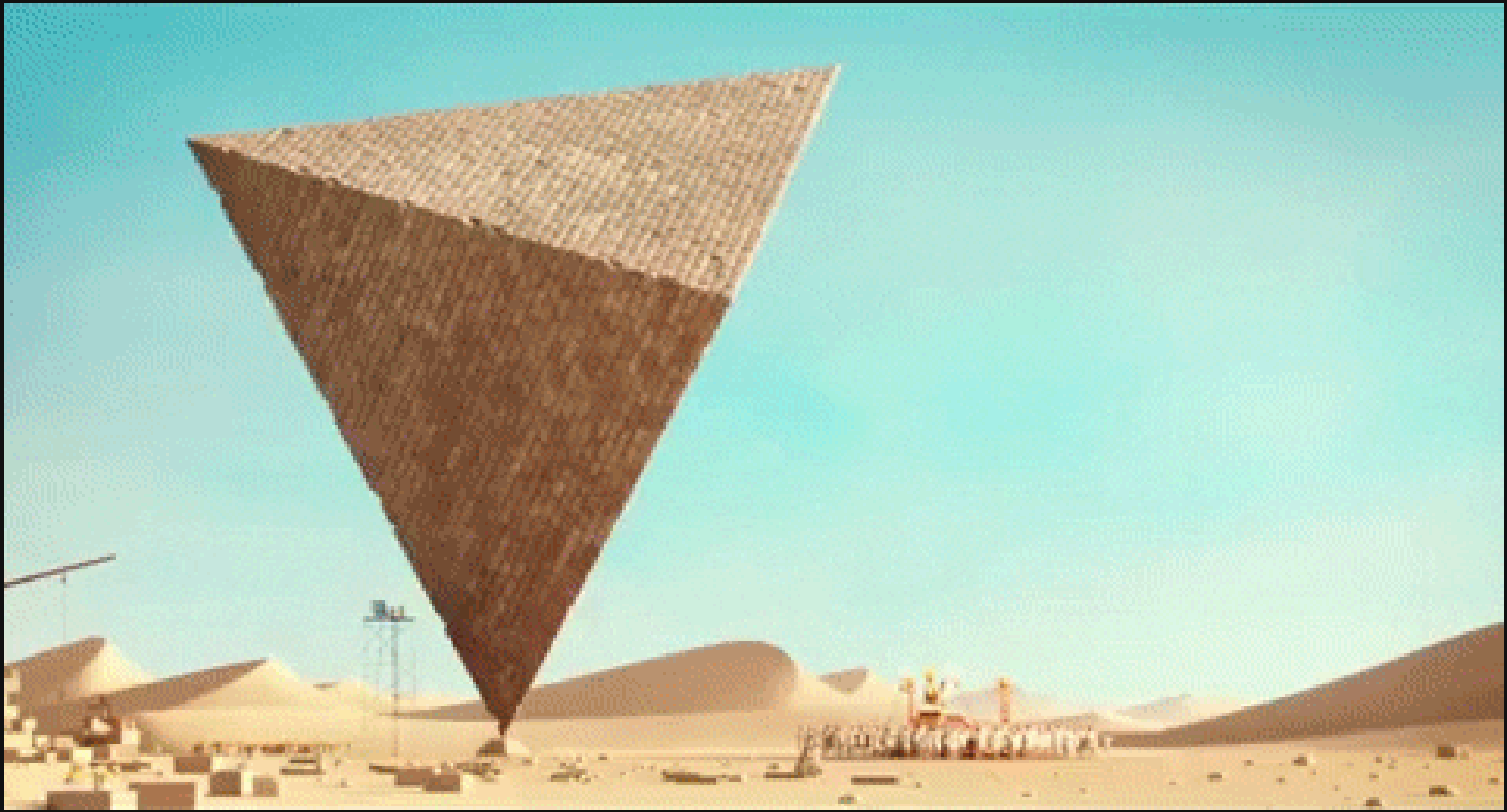
Write a method to find absolute value of a number.

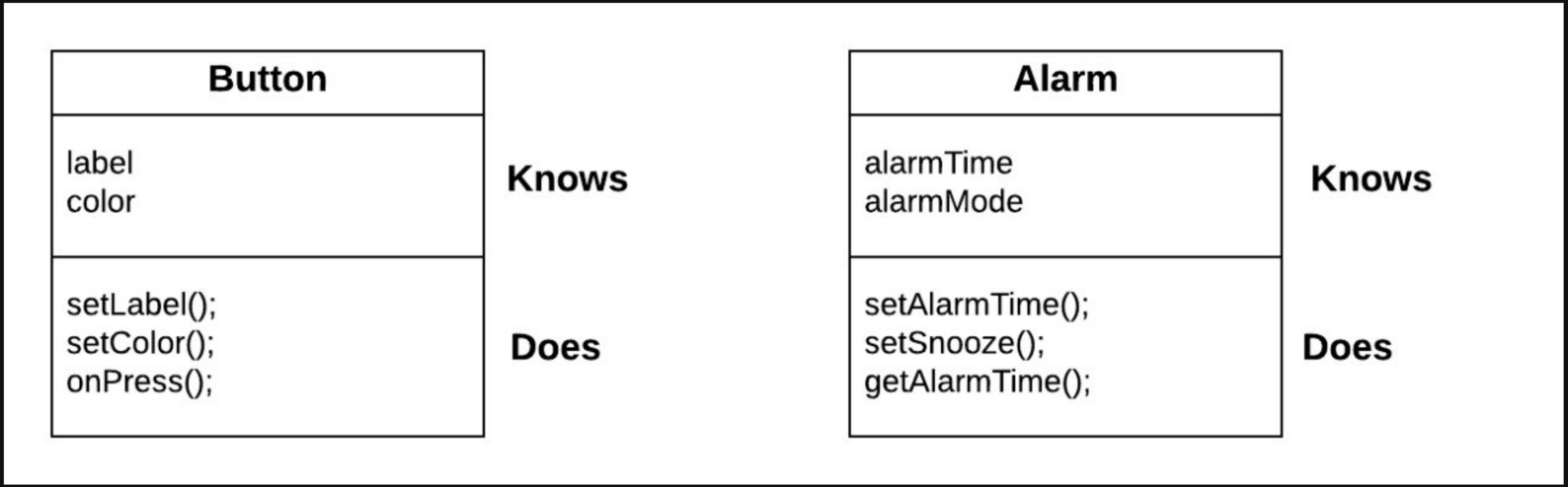
Problems-II 🚀

Write methods to convert

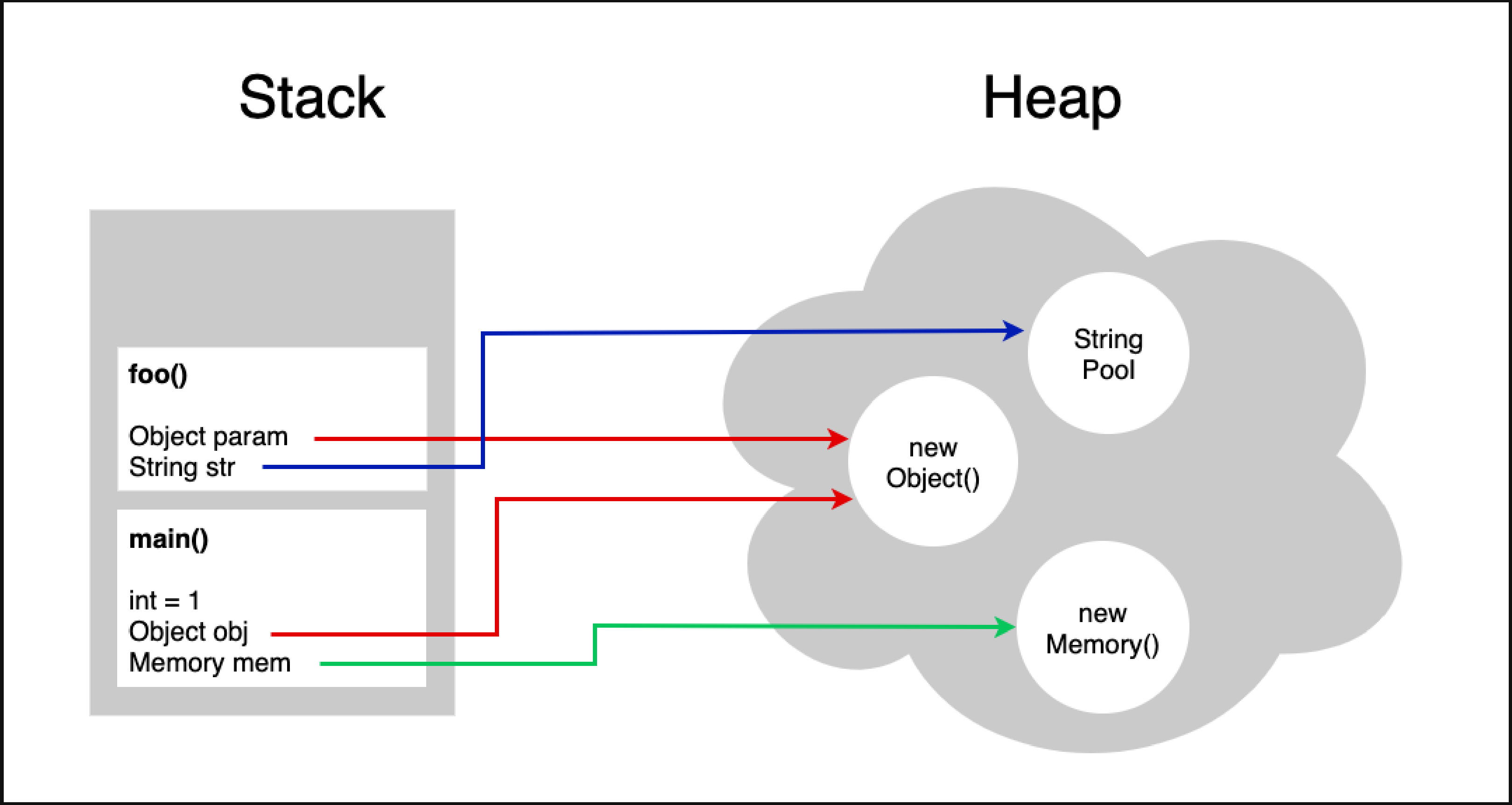
- decimal number to binary number.
- binary number to a decimal number

Stack & Heap Memory Models




Button
label
color
setLabel();
setColor();
onPress();
Knows
Does
Alarm
alarmTime
alarmMode
setAlarmTime();
setSnooze();
getAlarmTime();
Knows
Does

Objects live on the Heap!



Stack & Heap Memory

Garbage Collector!

Garbage Collection deals with finding and deleting the garbage from memory.

However, in reality, *Garbage Collection* tracks each and every object available in the heap space and removes unused ones.

In Java, GC works in two simple steps known as Mark and Sweep:

Mark – it is where the garbage collector identifies which pieces of memory are in use and which are not
Sweep – this step removes objects identified during the "mark" phase

In Python, GC works by reference counting algorithm. Memory is freed up when the reference count becomes zero for that object.

Advantages

- No manual memory allocation/deallocation handling because unused memory space is automatically handled by *GC*
- Automatic *Memory Leak* management (*GC* on its own can't guarantee the full proof solution to memory leaking, however, it takes care of a good portion of it)

Disadvantages

- Since GC has to keep track of object reference creation/deletion, this activity requires more CPU power than the original application. It may affect the performance of requests which required large memory

- Programmers have no control over the scheduling of CPU time dedicated to freeing objects that are no longer needed

- Automatised memory management will not be as efficient as the proper manual memory allocation/deallocation

Prime Number Print

That's it!