



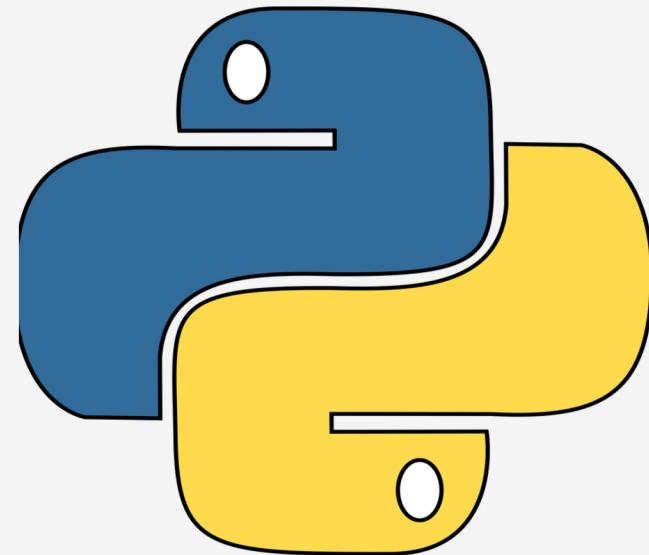
High-Level Language Comparision

Majd Riyad

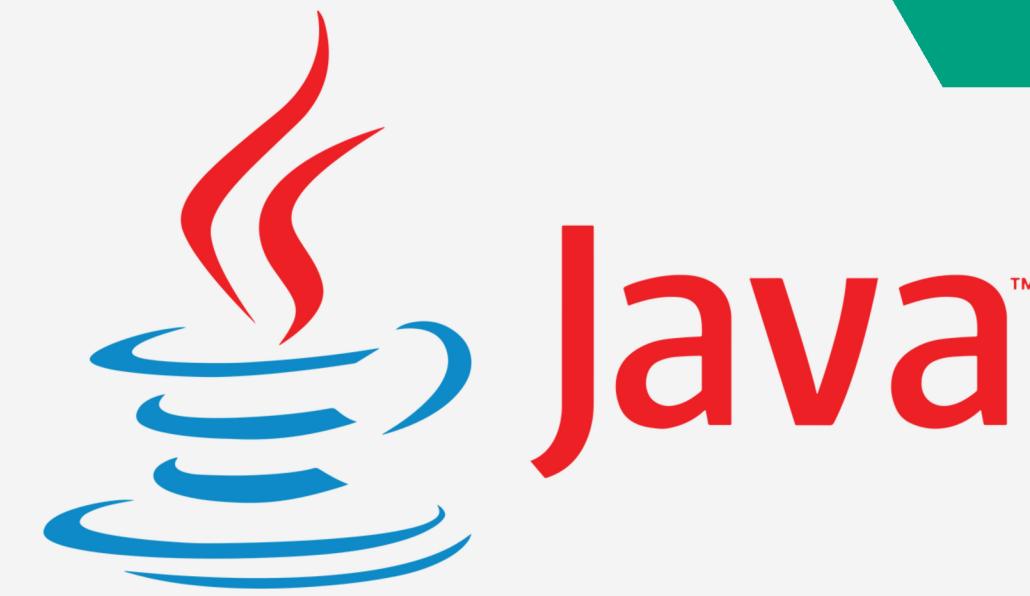


High-Level Language Types

- Compiled Language
- Interpreted Language
- Hybrid Language

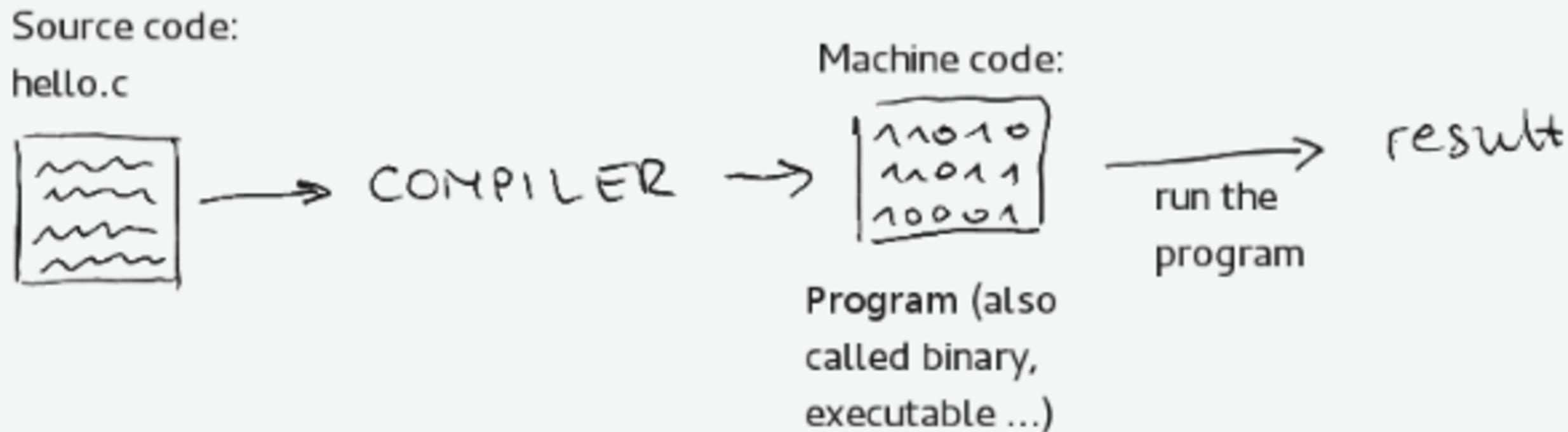


python



Compiled Language

- Uses **compilers**.
- Translated **directly** into machine code.
- Uses **more** memory
- Execution is **faster**



Interpreted Language

- Uses **Interpreter**.
- Translated **line by line**
- Uses **less** memory
- Execution is **slower**

Source code:

hello.py

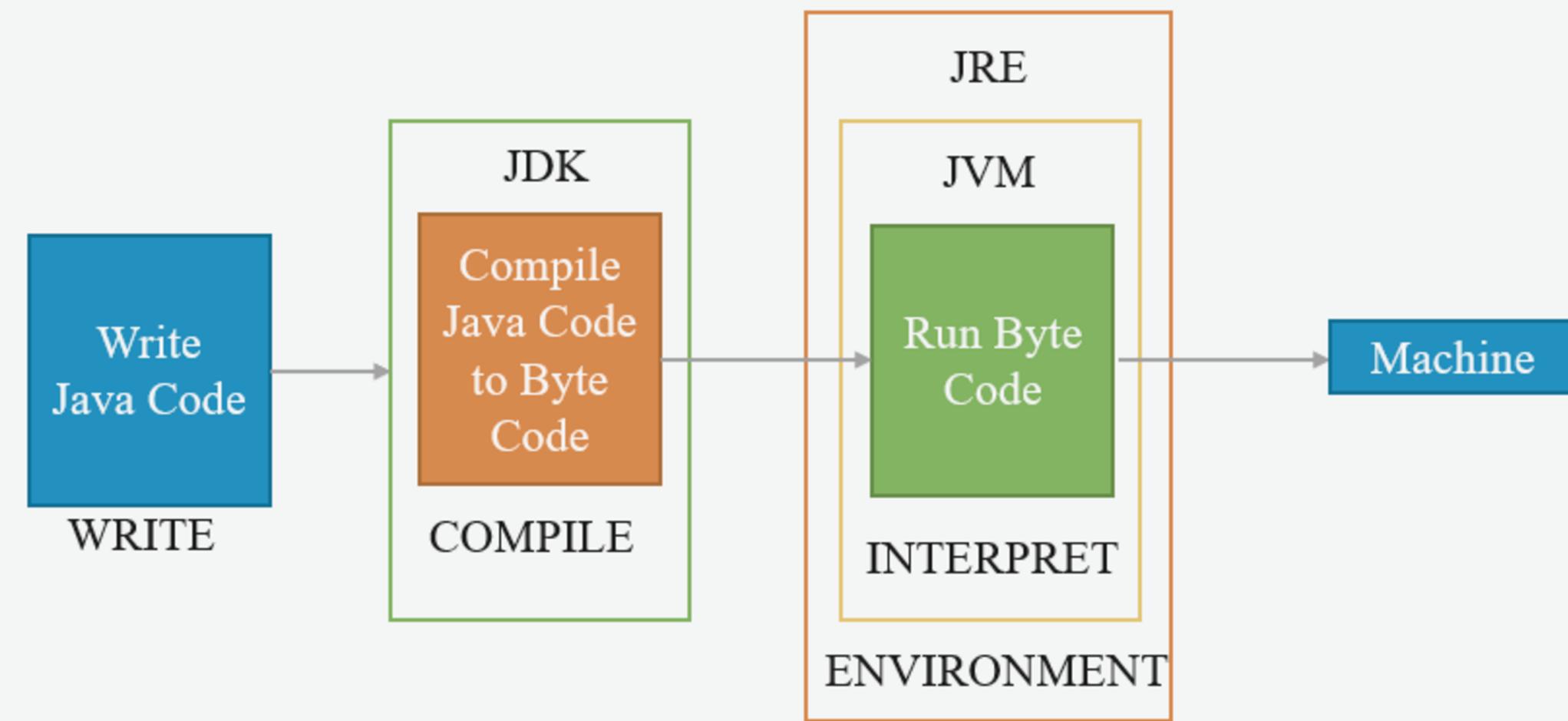


→ INTERPRETER → result



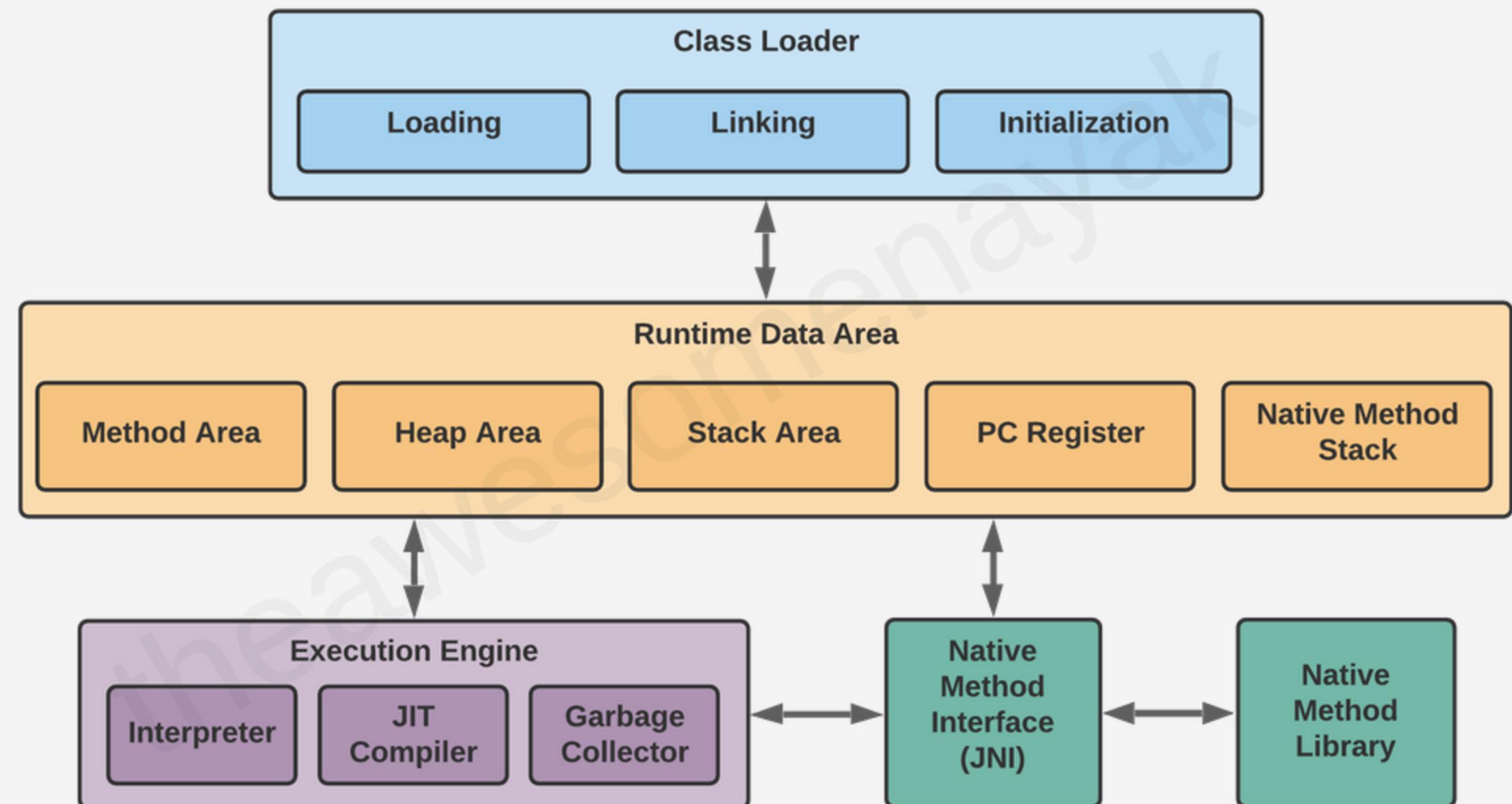
Hybrid Language

- Uses **Interpreter** and **Compiler**.
- Code is initially interpreted.
- Frequently executed sections of code are compiled into machine code at runtime.
- Hybrid approach **improves** performance.



Java Virtual Machine (JVM)

- Class Loader
- Runtime Memory/Data Area
- Execution Engine



High-Level Language Memory Management

- Automatic
- Manual



Manual Memory Management

- Used in **C/C++**
- Uses **malloc** and **free** functions

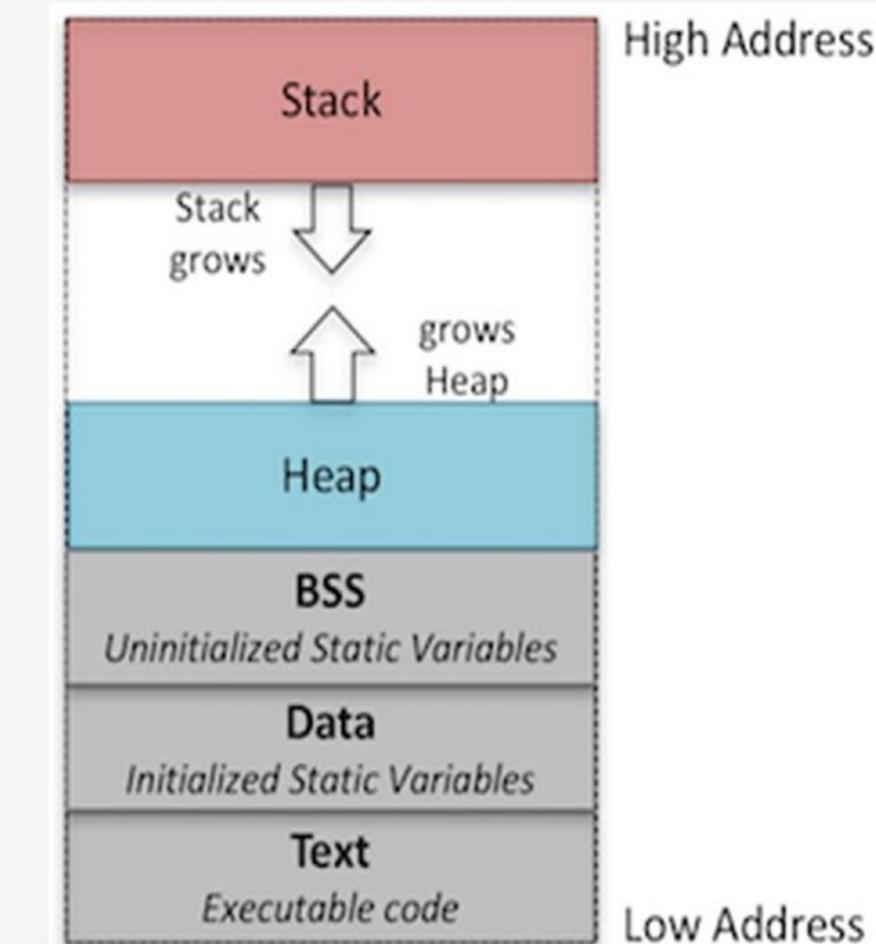
calloc ()

malloc()

realloc()

free()

new & delete



C/C++

Automatic Memory Management

- Used in **Java**, **JavaScript** and **Python**.
- Done via **garbage collection**.

Garbage Collection In Python

- Reference Counting
- Generational garbage collection

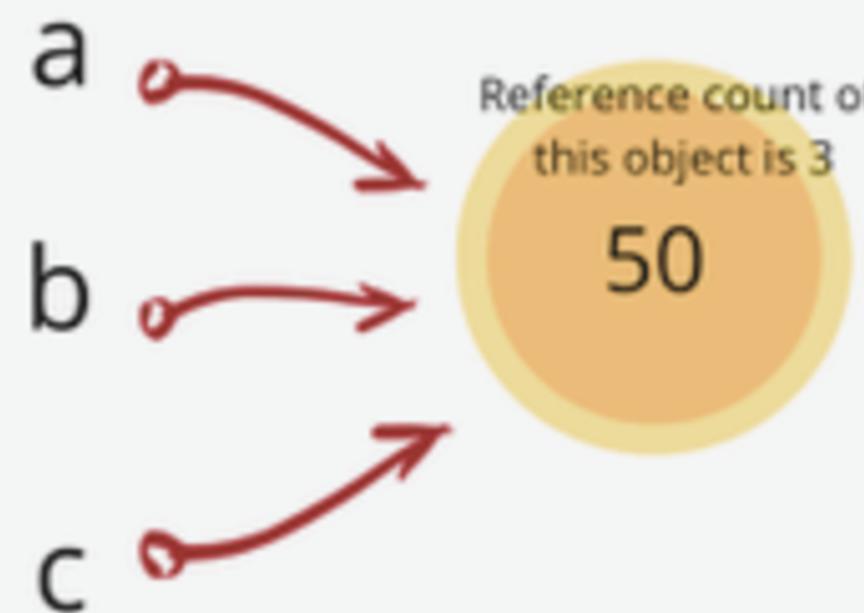


Reference Counting (1/2)

```
a = 50  
b = a  
c = 50  
print(id(a))  
print(id(b))  
print(id(c))
```

```
4364962480  
4364962480  
4364962480
```

There is 1 object, 3 names and 3 references!

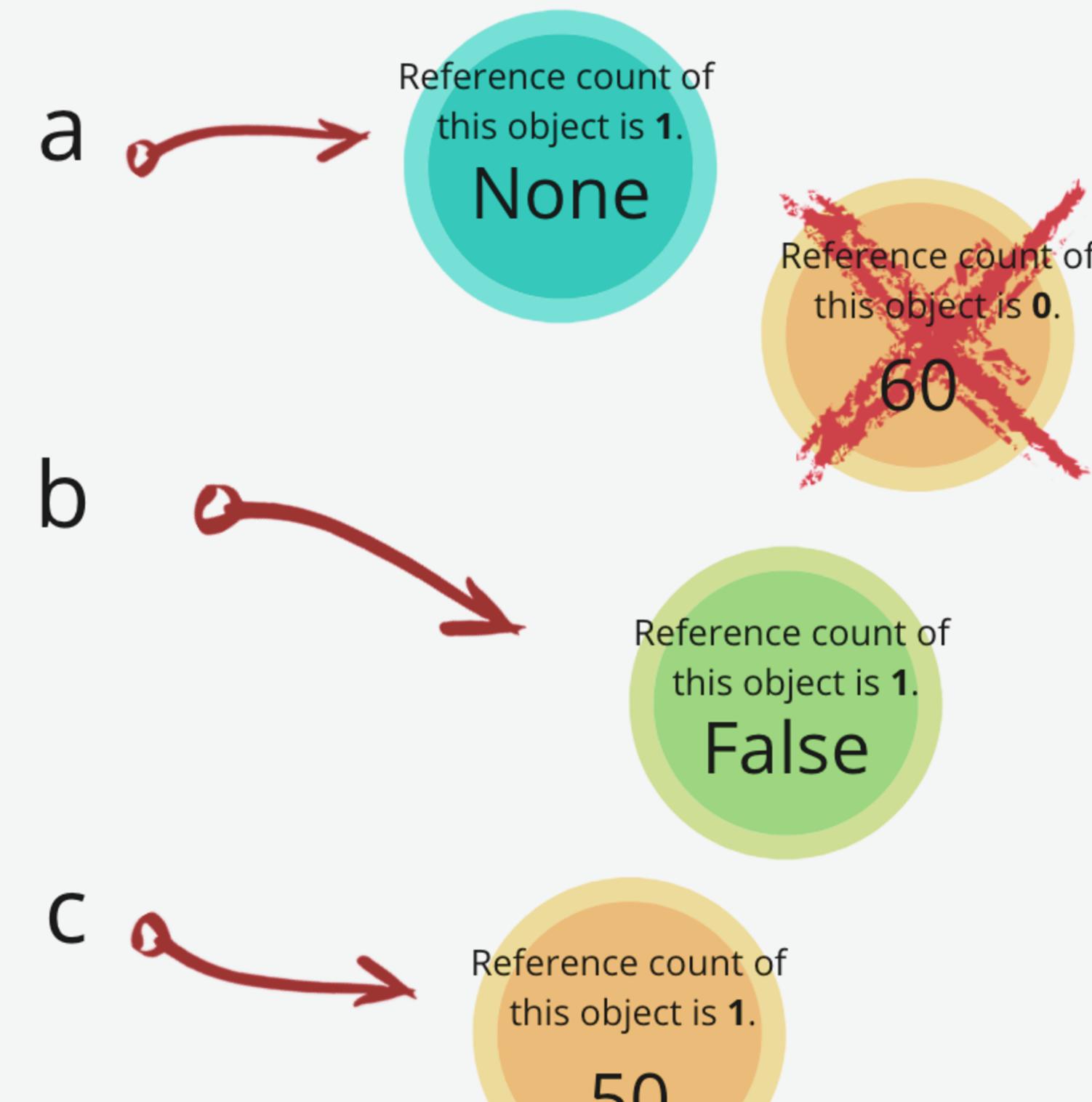


```
print(a is b)  
print(c is b)  
print(a is c)
```

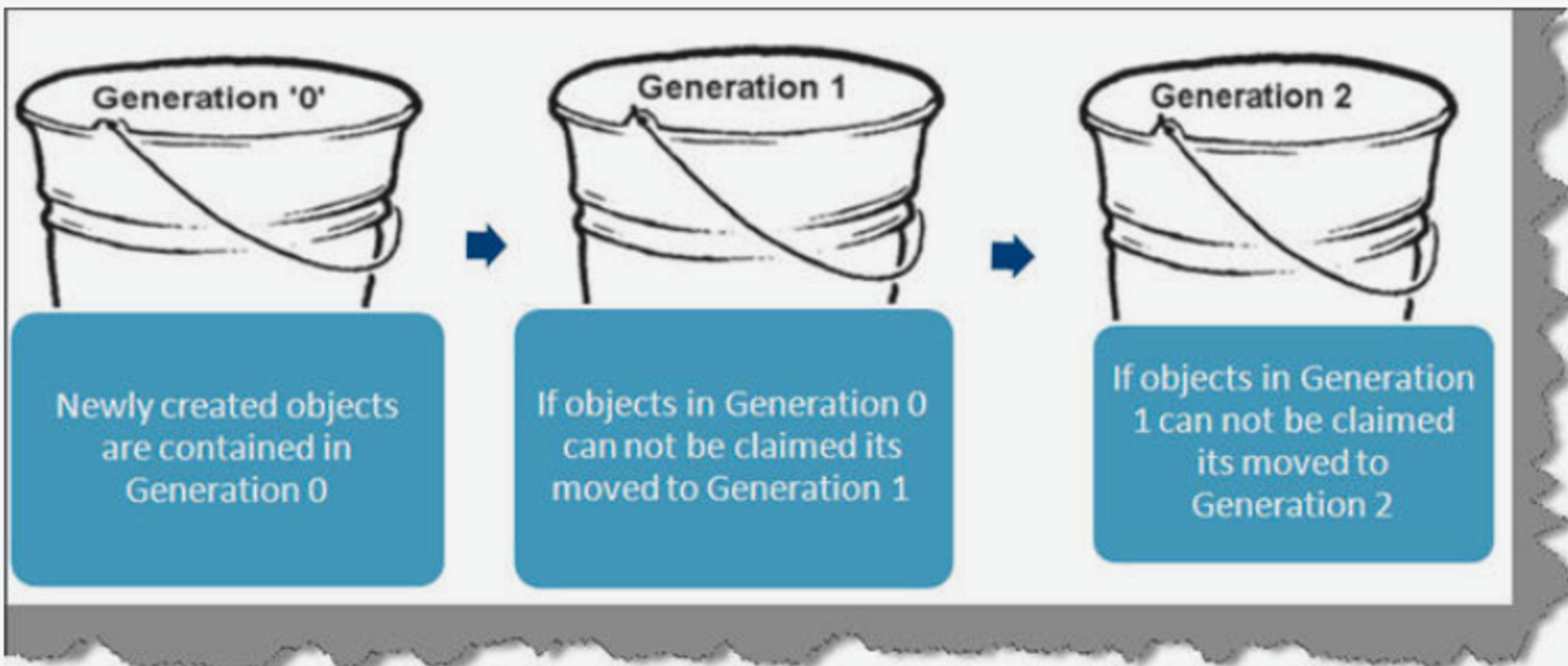
```
True  
True  
True
```

Reference Counting (2/2)

```
a = None  
b = False  
  
print(id(a))  
print(id(b))  
print(id(c))  
  
4364658792  
4364558736  
4364962480
```



Generational garbage collection

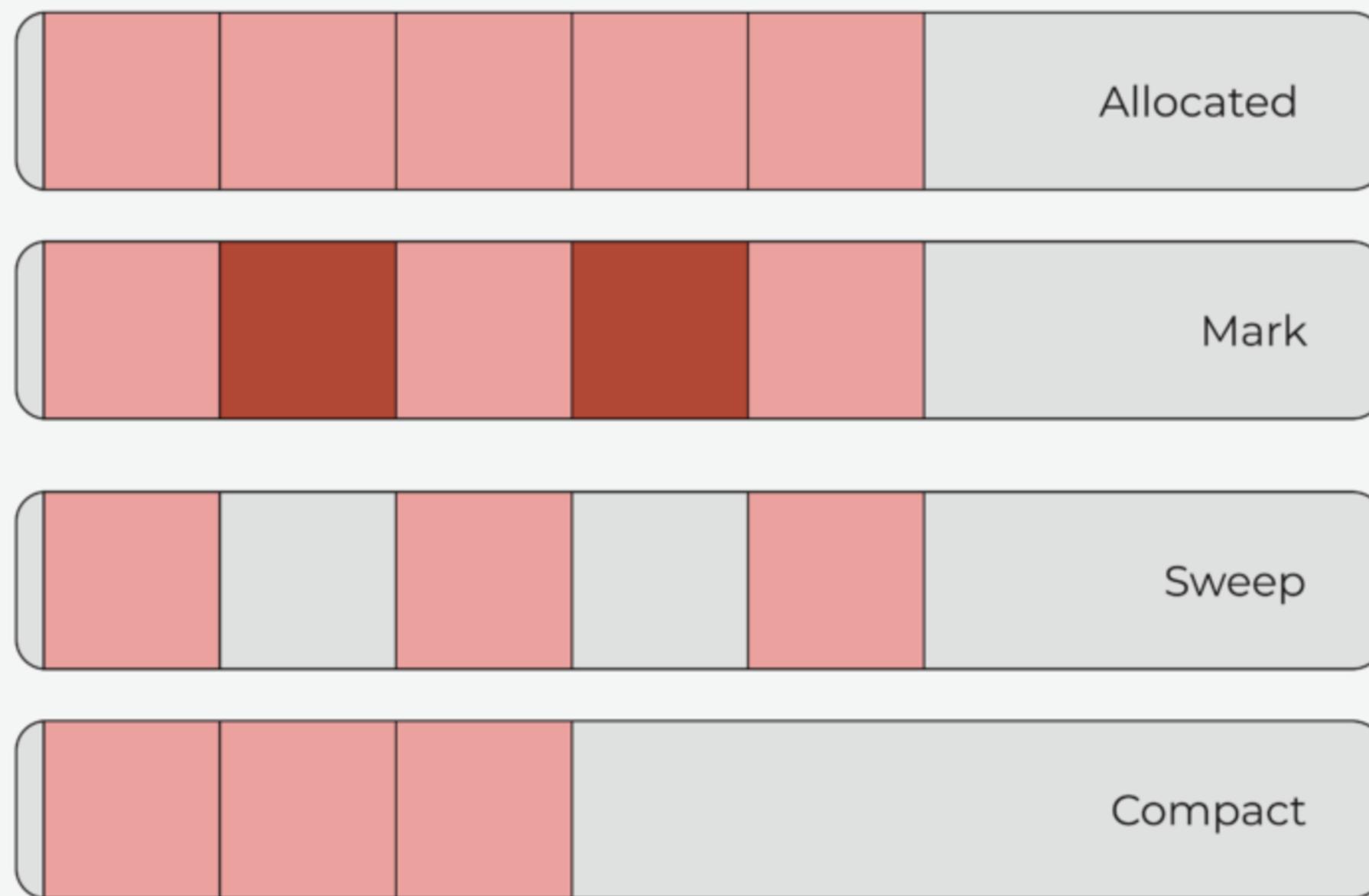


Garbage Collection In Java

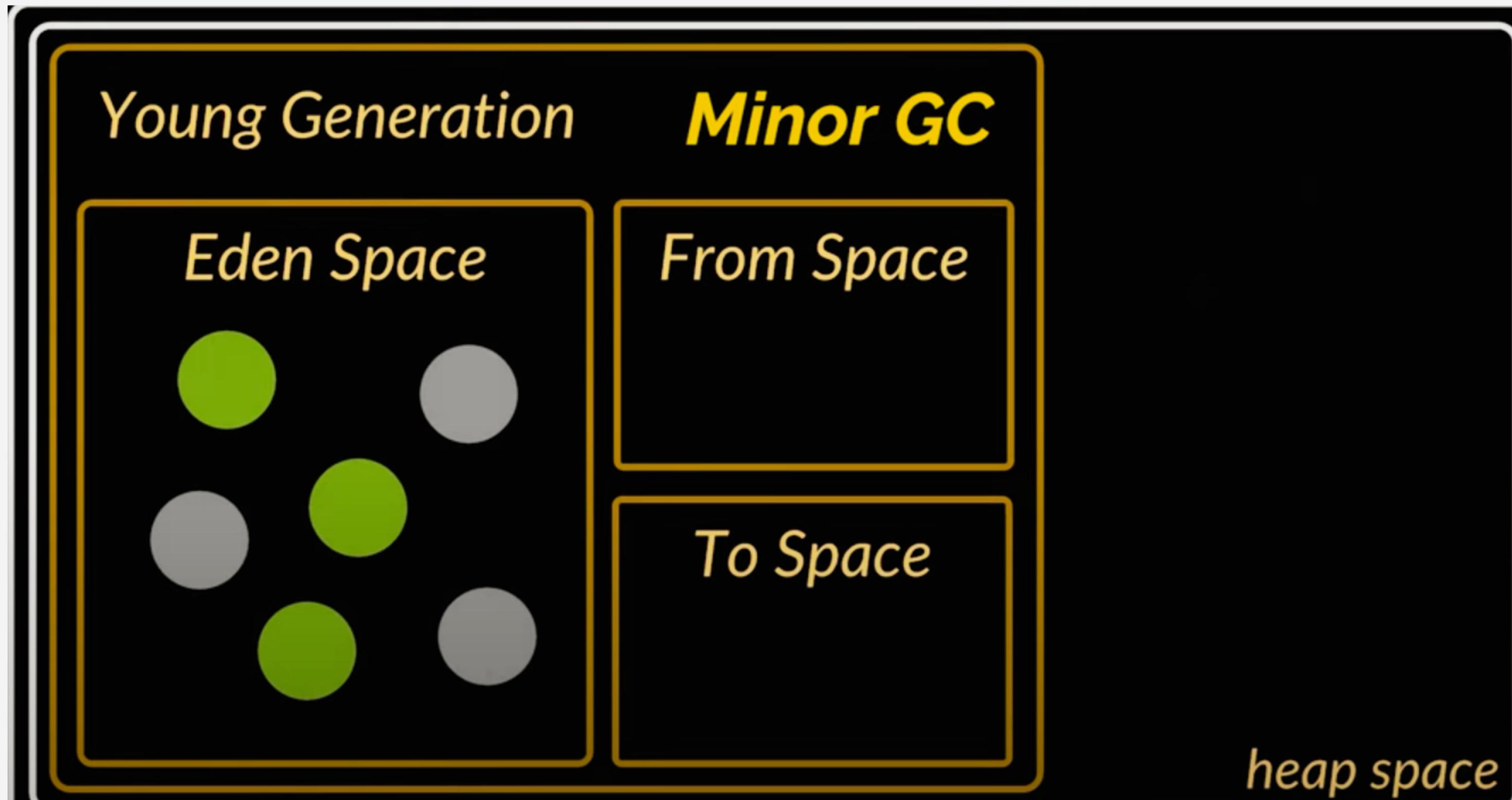
- Marking, Sweeping and Compacting
- Generational
- Types of Garbage Collectors



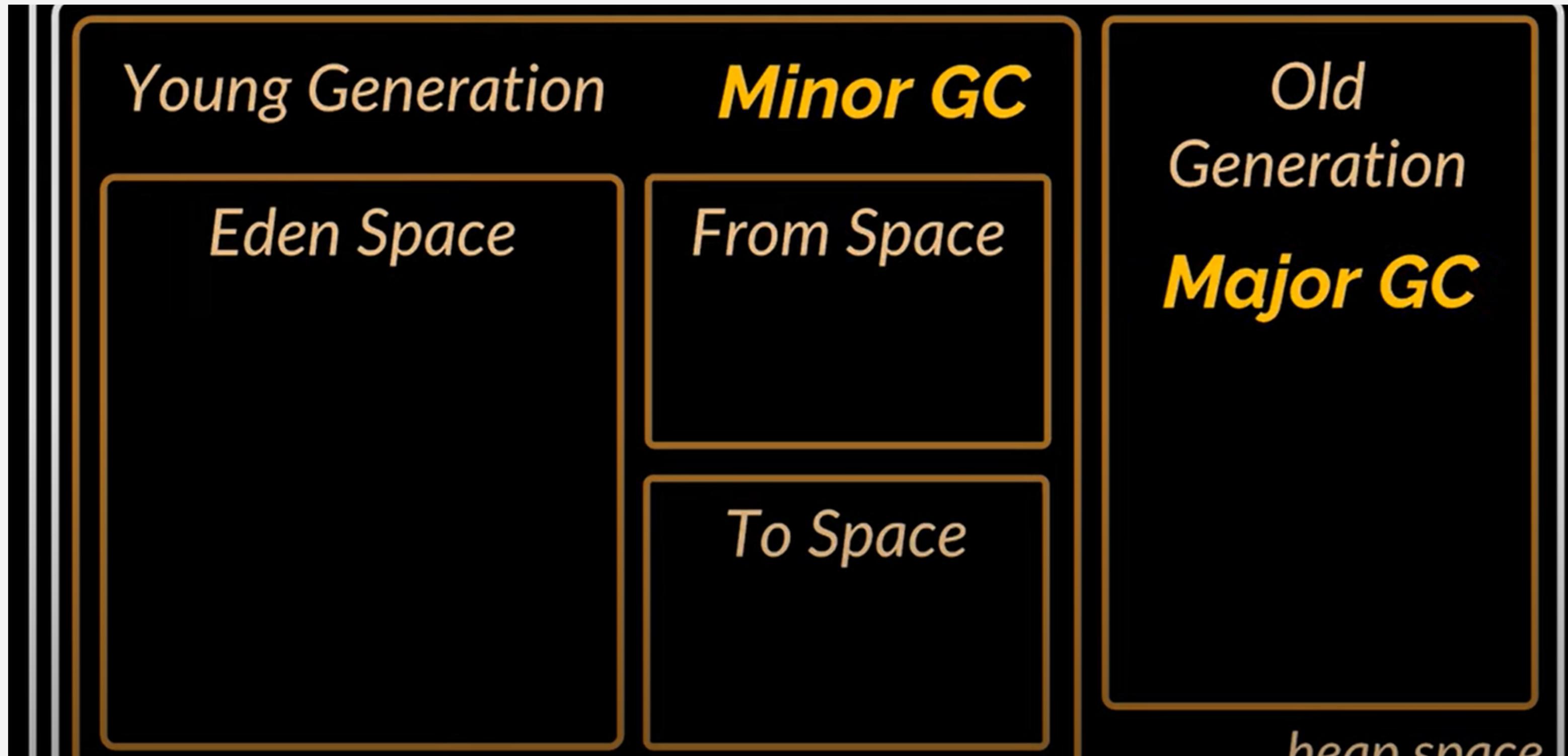
Marking, Sweeping and Compacting



Generational garbage collection(1/2)



Generational garbage collection(2/2)

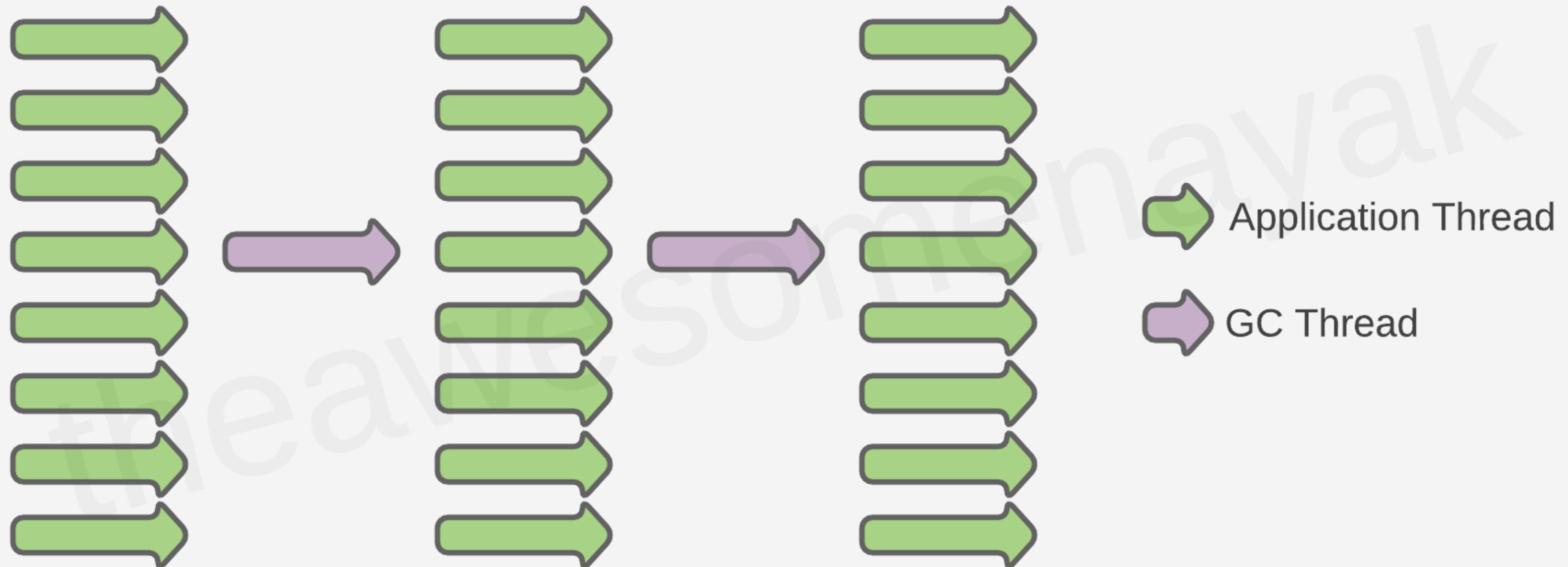


Types of Garbage Collectors

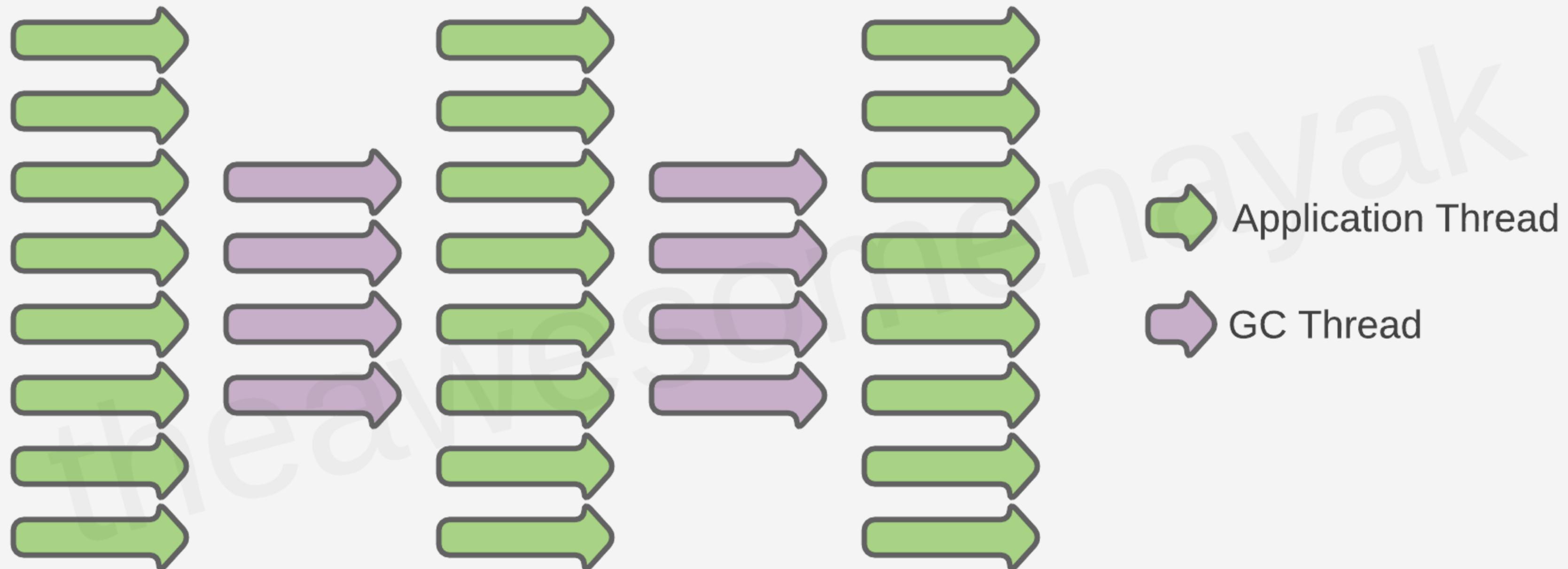
- Serial GC
- Parallel GC
- CMS (Concurrent Mark Sweep) GC



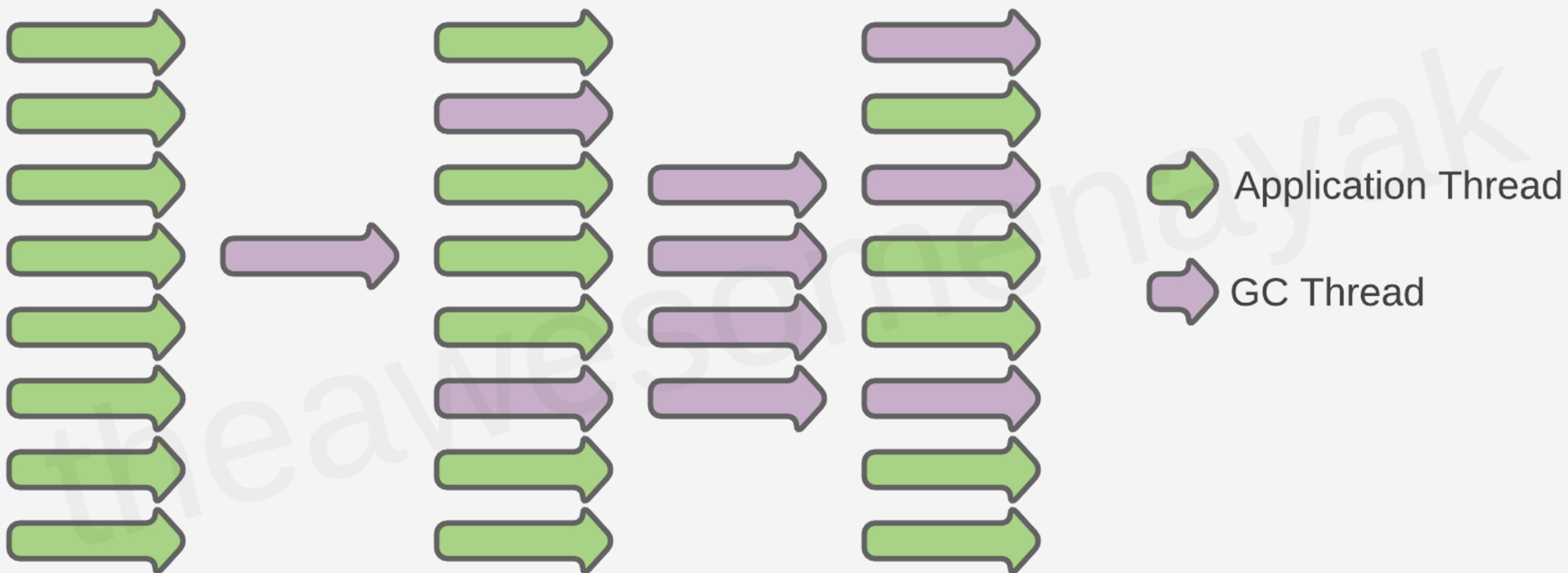
Serial GC



Parallel GC



CMS (Concurrent Mark Sweep) GC





Thank You