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Garbage collection in the memory management

Submitted in partial fulfillment of the requirement of the advanced operating system

presented to:

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Outline

- ▶ Overview
- ▶ Object generation in garbage collector
- ▶ Algorithm
 - Mark & sweep
- ▶ Conclusion

Overview

- ▶ Objectives Memory management
- ▶ Search for unused resources in RAM and removed
- ▶ Use in other works using the garbage collector
- ▶ Impact on the working memory
- ▶ Pointers errors and variables

Garbage Collection in Memory Management

```
int *money;
```

```
int *money = NULL;
```

```
int a = 5;
```

```
int *money = NULL;
```

```
money = &a;
```

```
money = &a;
```

Contents	Address
0x00000005	0x8130
0x00008130	0x8134

```
int a = 5;
```

```
int *money = NULL;
```

```
*money = 8;
```

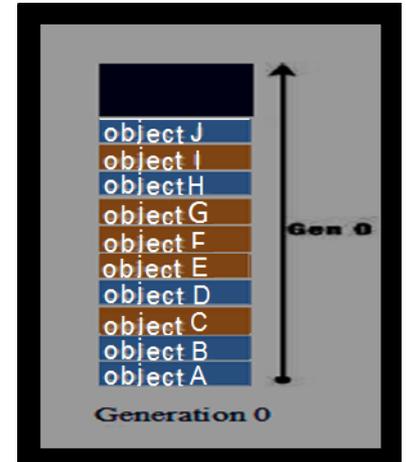
Contents	Address
0x00000008	0x8130
0x00008130	0x8134

Contents	Address
0x00000005	0x8130
0x00000000	0x8134

2

Object Generation in the Garbage Collector

- ▶ The object generation a mechanism used by GC for improve performance and access to unreachable objects
- ▶ will not begin examining all the object inside the heap, because it is taking a long time, special a big programs.
- ▶ Therefore dividing the generation to tree parts: generation 0 ,1 and 2

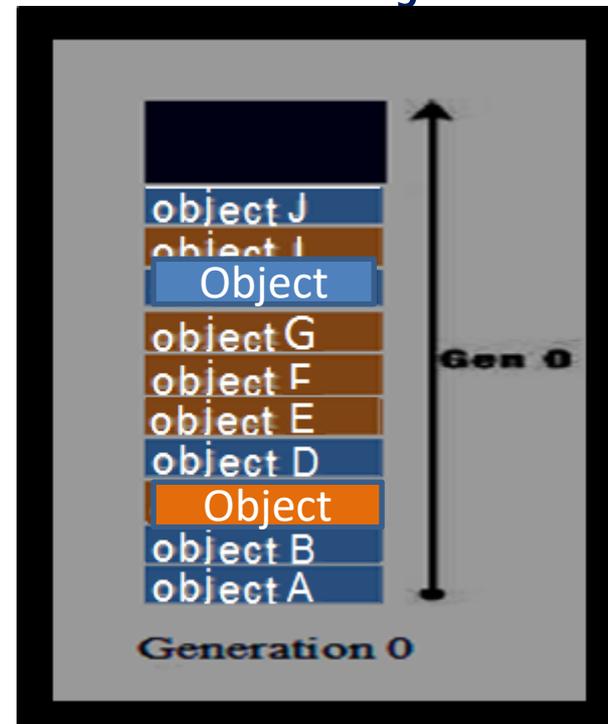


3



Object Generation (Cont,)

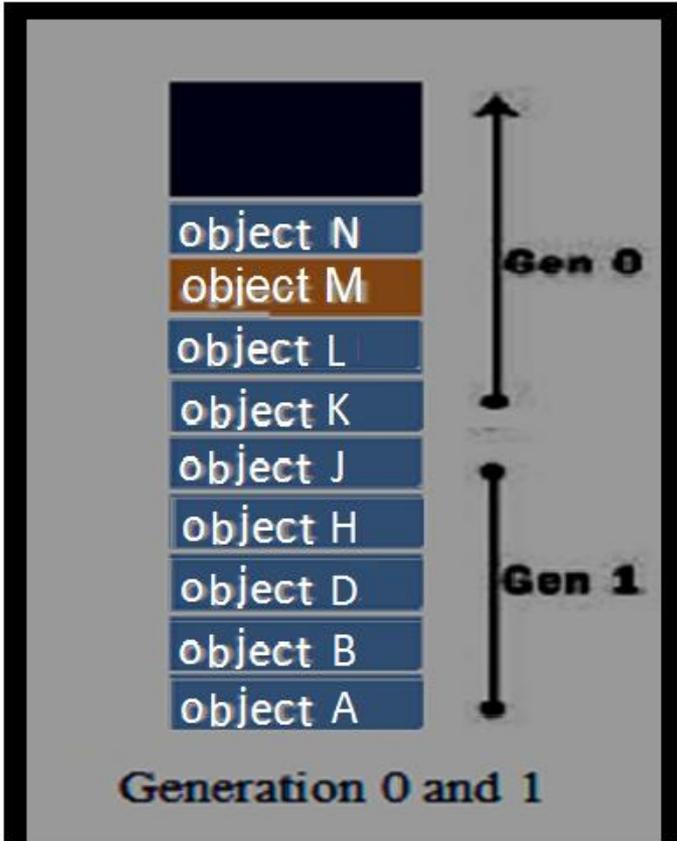
- ▶ Starts the GC analysis of the heap, precisely for generation 0
- ▶ The work of the scan of reachable of objects that survivor from the clean process fall under the generation



4



Garbage Collection in Memory Management



▶ Object Generation Cont,)

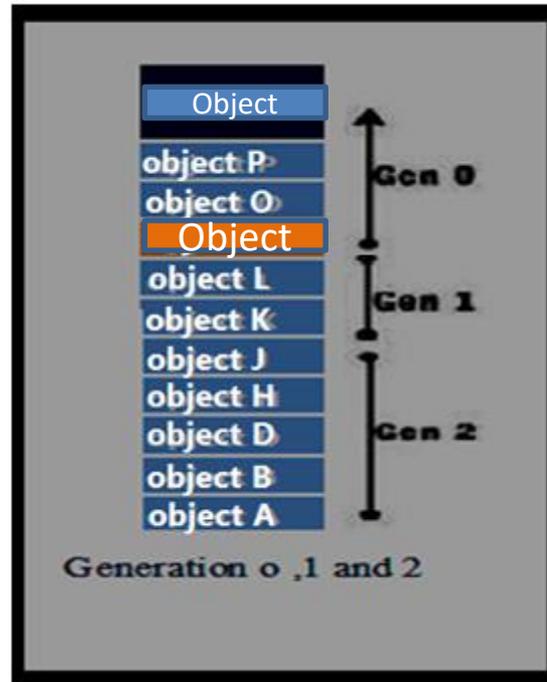
Object Cleaned

Object N New

Object Survived

Object Generation (Cont,)

When add objects, will work
clean first
generation 0
where space is
not enough
clean work of
generation 1
and also not enough
space is clean for
work generation 2



Algorithm

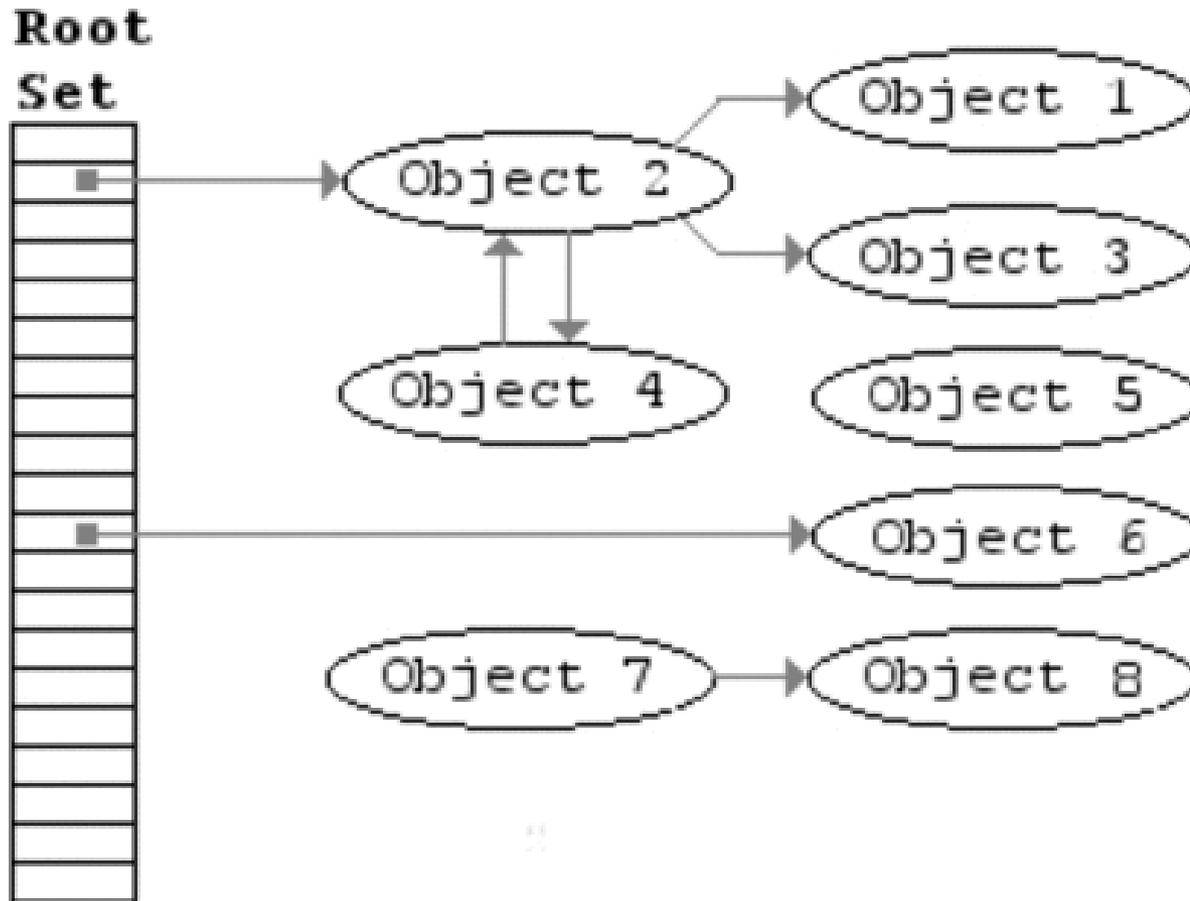
Mark and Sweep

Movement mark and Sweep is a Stack contains eight objects

 “Oval shape” represents objects

 represent references to objects

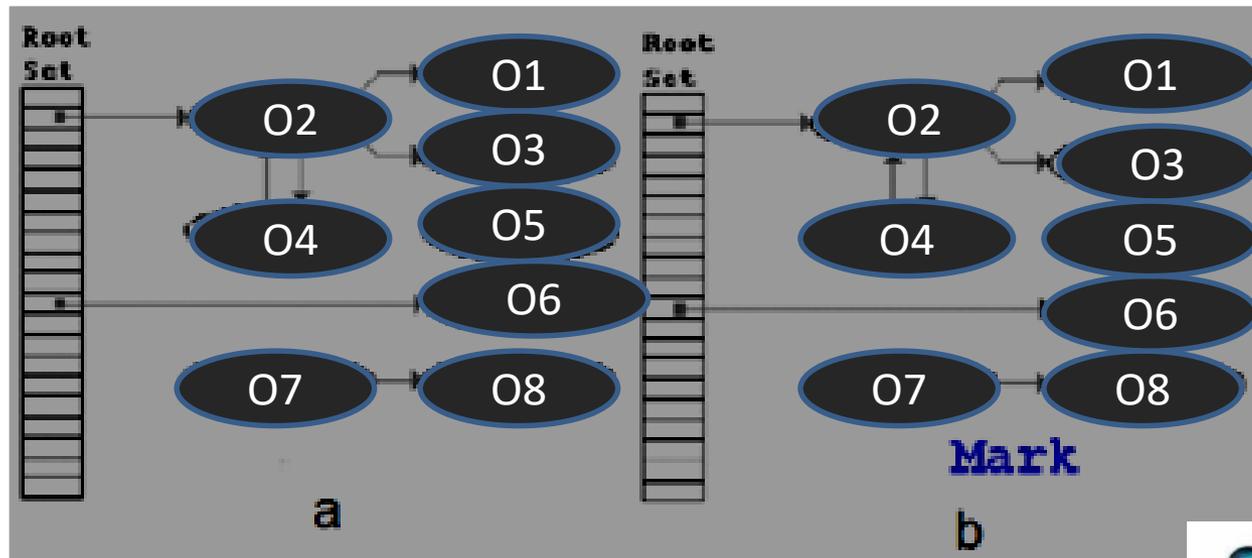
Garbage Collection in Memory Management



Mark and Sweep (cont,)

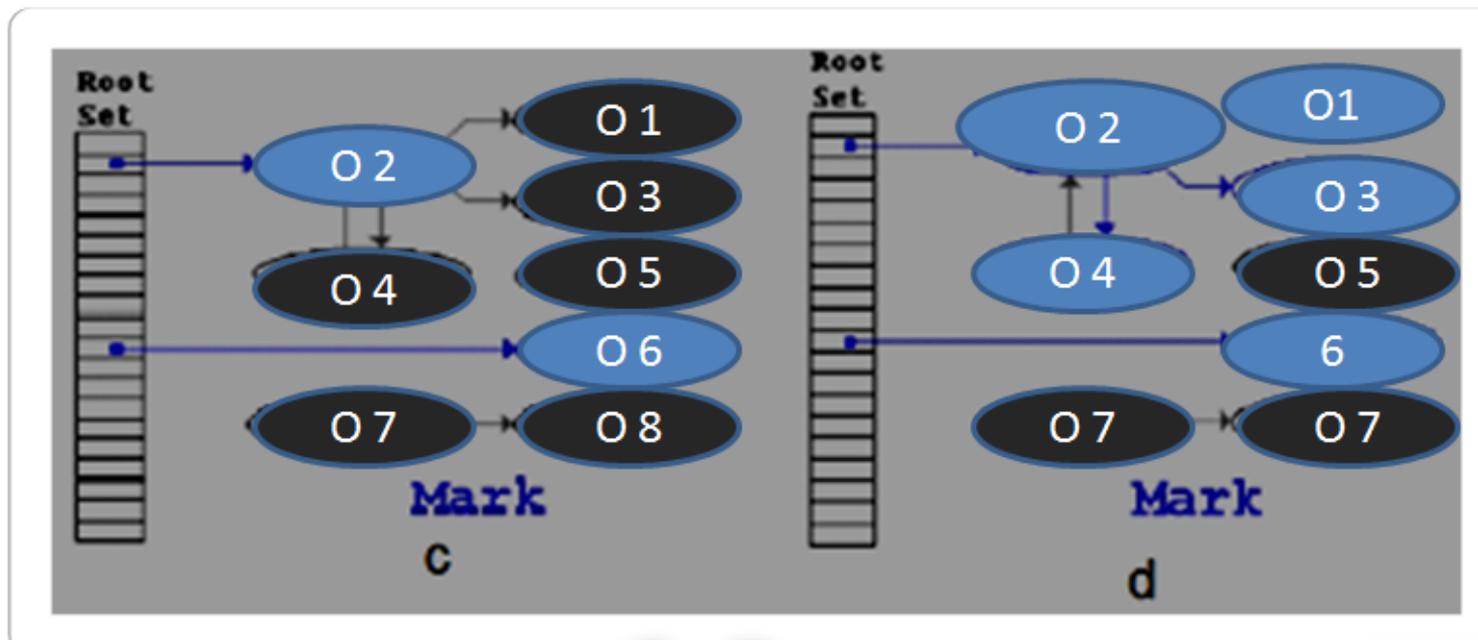
Objects No. 1, 2, 3, 4 and 6 referred to the root set

Objects No 5, 7 and 8 do not referred to root set, so it is Garbage



Mark and Sweep (cont,)

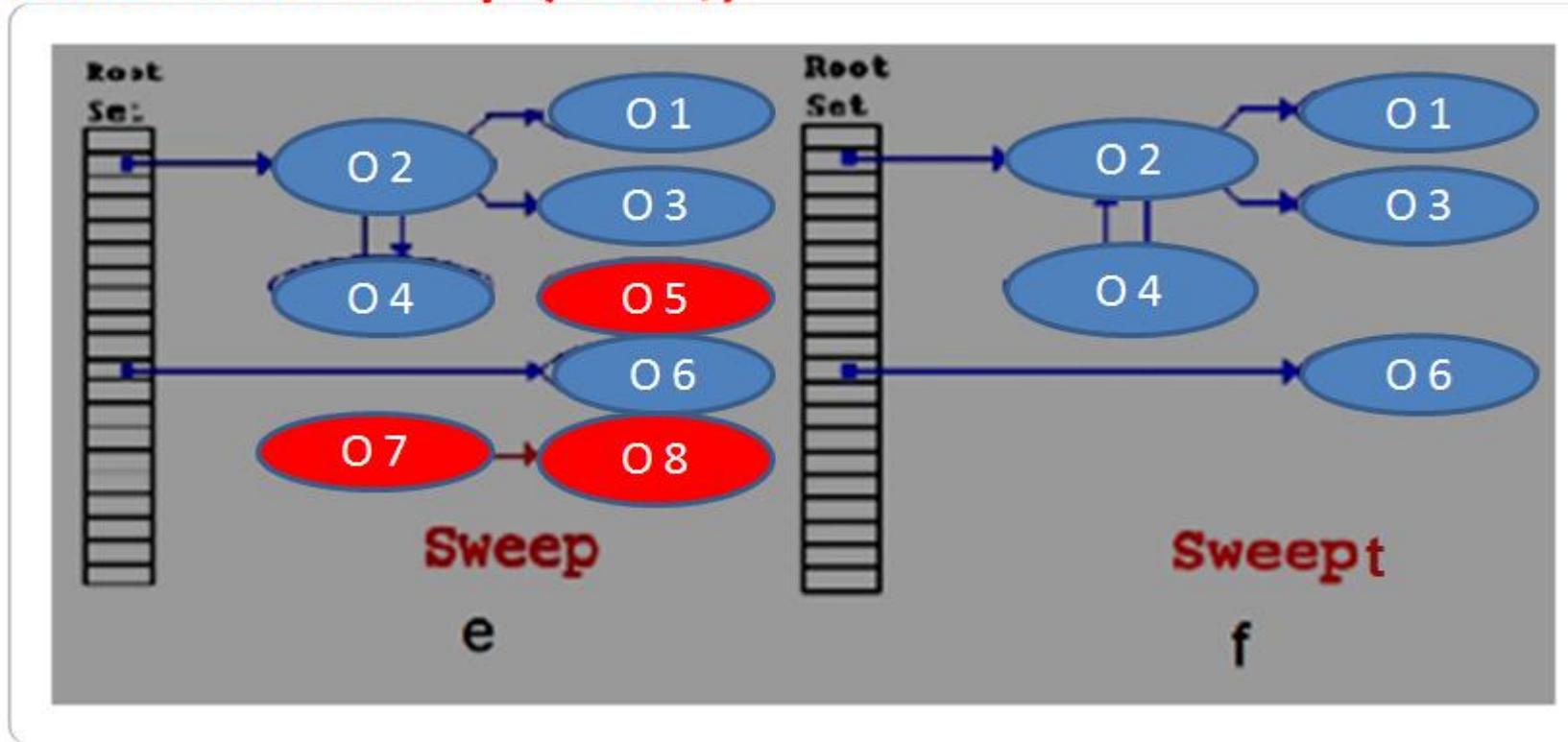
In the mark and sweep, each object in a memory has a flag (one bit) reserved for only use garbage collection



Mark and Sweep (cont,)

Memory is checked from start to finish, sometimes checked twice

Mark and Sweep (cont,)



Conclusion

- ▶ The work of the GC leads to accelerate the work of computer
- ▶ Editing large parts (unused) of the memory
- ▶ Has great usefulness in applications that require large memory capacities

such as real-time applications on the web , processing images , multimedia players and aviation systems



Thank you...

