More on Object Lifecycle

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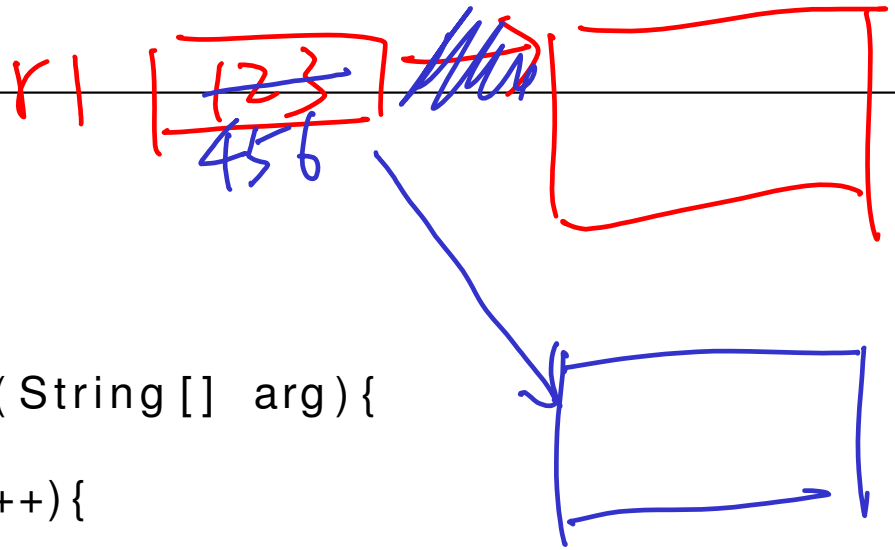
Garbage Collection (1/2)

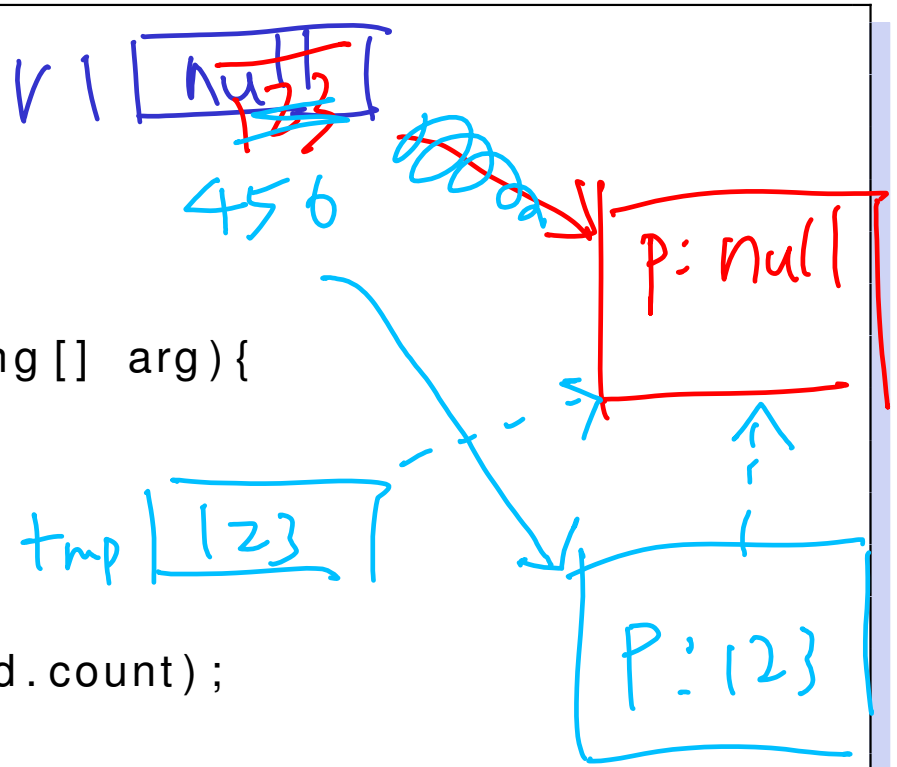
```
1  class Record{
2    static int count = 0;
3    Record(){ count++; }
4  }
5  public class RecordDemo{
6    public static void main(String[] arg){
7      int i; Record r1;
8      for(i = 0; i < 100; i++){
9        r1 = new Record();
10       System.out.println(Record.count);
11     }
12   }
13 }
```



- 100 instances created, only 1 alive after the loop
- the other 99 memory slots: automatically recycled

Garbage Collection (2/2)

```
1  class Record{
2    static int count = 0;
3    Record prev;
4    Record(){ count++; }
5  }
6  public class RecordDemo{
7    public static void main(String[] arg){
8      int i; Record r1 = null;
9      for(i = 0; i < 100; i++){
10       Record tmp = r1;
11       r1 = new Record();
12       r1.prev = tmp;
13       System.out.println(Record.count);
14     }
15   }
16 }
```



- 100 instances created, all of them alive

Garbage Collection: Key Point

Garbage Collection: when a memory slot becomes an orphan (and) system in need of memory

Finalizer (1/2)

```
1  class Record{
2    static int mem = 0;
3    Record(){ mem += 10; }
4    void when_truck_comes(){ mem -= 10; }
5  }
6  public class RecordDemo{
7    public static void main(String[] arg){
8      int i; Record r1;
9      for(i = 0; i < 100; i++){
10       r1 = new Record();
11       System.out.println(Record.mem);
12     }
13   }
14 }
```

- finalizer: something you want to do when truck comes
- calculate memory usage, write something back (say, on BBS), ...

Finalizer (2/2)

```
1  class Record{
2    static int mem = 0; static int count = 0;
3    int id;
4    Record(){ mem += 10; count++; id = count; }
5    protected void finalize() throws Throwable{
6      System.out.print(id);
7      System.out.println(", Good Bye!");
8      mem -= 10;
9    }
10 }
11 public class RecordDemo{
12   public static void main(String[] arg){
13     int i; Record r1 = null;
14     for(i = 0; i < 100; i++){
15       Record tmp = r1; r1 = new Record();
16       System.out.println(Record.mem);
17     }
18   }
19 }
```

- GC: no guarantee on when the truck comes
- if JVM halts before truck comes, even no finalizer calls

Finalizer: Key Point

finalizer:

a mechanism to let the instance say goodbye

Object Lifecycle (1/1)

```
1  class Record{
2    int score;
3    Record(int init_score){ score = init_score; }
4    protected void finalize() throws Throwable{ }
5  }
6  public class RecordDemo{
7    public static void main(String[] arg){
8      Record r; //reference declared
9      Record r2;//reference declared
10     r = new Record(60); //memory allocated (RHS)
11                         //and constructor called
12                         //reference assigned (LHS)
13     r2 = r;             //reference copied
14     r.score = 3;        //instance content accessed
15     r.show_score();     //instance action performed
16     r2 = null; r = null;//memory slot orphaned
17     //....
18                         //finalizer called
19                         //or JVM terminated
20   }
21 }
```

Object Lifecycle: Key Point

we control birth, life, death, funeral design, but not the exact funeral time