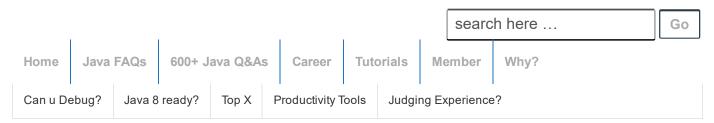
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03: ♦ ♥ Java autoboxing & unboxing – benefits & caveats interview Q&A

Posted on June 29, 2015 by Arulkumaran Kumaraswamipillai



Q1. What do you understand by the terms "autoboxing" and "autounboxing" in Java?

A1. Java automatically converts a primitive type like "int" into corresponding wrapper object class Integer. This is known as the **autoboxing**. When it converts a wrapper object class Integer back to its primitive type "int", it is know as "autounboxing".

Example 1:

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⊟ Core Java Interview €

--01: ♦ ♥ 17 Java (

```
package com.autoboxing;
3
   public class AutoBoxUnbox {
4
5
       public static void main(String□ args) {
6
7
           int i = 5:
           Integer objI = i; //autoboxing takes pla
8
9
10
           if(objI != null)
11
12
                int result = objI + 3; //auto unboxi
13
                System.out.println(result);
14
15
       }
16 }
```

This can be applied to one of 8 primitivies in Java to convert from primitive to wrapper via autoboxing and from wrapper to primitive via autounboxing. Autoboxing and unboxing can happen anywhere where an object is expected and primitive type is available

Example 2:

```
package com.autoboxing;
3
  import java.util.ArrayList;
   import java.util.HashMap;
   import java.util.List;
6
  import java.util.Map;
8
  public class AutoBoxUnbox {
9
10
       public static void main(String□ args) {
11
           List<Character> characters = new ArrayLi
12
13
           characters.add('C'); //autoboxed to Char
14
15
           Map<Long, Double> myMap = new HashMap<>(
           myMap.put(5L, 12.50); //autoboxed to Lon
16
17
18
           char myChar = characters.get(0); //unbox
19
           System.out.println(myChar);
20
21
           double myDouble = myMap.get(5L); //unbox
22
           System.out.println(myDouble);
23
       }
24
25
```

- Q2. What are the benefits of autoboxing?
- A2. Less code to write, and the code looks cleaner.

```
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   → Java Garbage
```

For example, you don't have to do as shown below:

```
1 list.add(Integer.valueOf(6));
```

More readable with autoboxing

```
1 list.add(6);
```

Q3. What are some of the pitfalls of autoboxing?

A3. It is very convenient to have autoboxing, but it

A3. It is very convenient to havae autoboxing, but it can cause issues and many beginners fall into it caveats.

1. Unnecessary Object creation due to Autoboxing

```
package com.autoboxing;
3
   public class AutoBoxUnbox {
4
5
       public static void main(String[] args) throw
6
            Integer sum = 0;
8
           for (int i = 1000; i < 500000; i++) {
9
                sum += i;
10
                Thread.sleep(100);
           }
11
12
       }
13 }
```

Q. How do you know unnecessary objects are being created?A. jmap to the rescue.

Step 1: Run the above code.

Step 2: Open a DOS or Unix command prompt and run the following commands. "jps" to find the process id, and then "jmap" to print the object graph

```
1 C:\>jps
2 8148
3 8420 Jps
4 3832 JConsole
5 8896 AutoBoxUnbox
6 10300 JConsole
7 10948 JConsole
```

```
....03: Java GC tun
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    Java ExecutorSe
  Producer and Co
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   → Splitting input t
    ◆ Tree traversal :

♦ Java coding
```

```
8
9 C:\>jmap -histo:live 8896 > mem.txt
10
11
```

Step 3: Inspect the mem.txt file

after some time

You can see the growing instances and bytes.

Now try the samething after fixing the code as shown below.

```
package com.autoboxing;
2
   public class AutoBoxUnbox {
4
5
       public static void main(String[] args) throw
6
7
           int sum = 0; //FIX. change to primitive
8
           for (int i = 1000; i < 500000; i++) {
9
                sum += i:
10
                Thread.sleep(100);
11
           }
12
       }
13
```

```
1
2 num #instances #bytes class name
3 ------
4 8: 256 4096 java.lang.Int
5
6
```

after some time

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    Sorting objects

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```

```
1
2 num #instances #bytes class name
3 ------
4 8: 256 4096 java.lang.Inte
5
```

The improved code does not create unnecessary Integer objects. You may also like the detailed "javap, jps, jmap, and jvisualvm tutorial – analyzing the heap histogram"

2. GC overhead

Unnecessarily creating too many objects and then discarding them will increase the Garbage Collection overhead. This may cause performance impact due to more frequent garbage collection.

3. java.lang.NullPointerException

Especially when mixing object and primitive in equality and relational operator.

```
package com.autoboxing;
2
  public class AutoBoxUnbox {
4
5
       public static void main(String∏ args) throw
6
          Integer i = null;
7
8
          if(i > 6) { // tries to do i.intValue();
9
              System.out.println("I am in here");
10
11
       }
12
```

Conditional operators can cause NullPointerException.

```
package com.autoboxing;
2
   public class AutoBoxUnbox {
4
5
       public static void main(String∏ args) throw
6
           boolean b = false;
7
           double d1 = 0d;
8
           Double d2 = null;
9
           Double d = b ? d1 : d2; //NullPointerExc
10
       }
11 }
12
```

```
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Since d1 is primitive, d2 is implicitly tried to auto unbox. To fix it, you need to change d1 to wrapper object type "**Double**". This way auto unboxing won't take place.

4. Overloading

Q. What will be the output of the following code?

```
package com.autoboxing;
23
   public class AutoBoxUnbox {
5
       public static void main(String[] args) throw
6
            Integer value = 0;
7
           new AutoBoxUnbox().eval(value);
8
9
10
       void eval(long val) {
11
            System.out.println(1);
12
13
14
        void eval(Long value) {
15
           System.out.println(2);
       }
16
17 }
```

A. The result is **1**, because there is no direct conversion from Integer to Long, so the "conversion" from Integer to long is used.

Q4. How will you go about debugging auto boxing and unboxing error?

- 1) Being aware of the potential auto boxing and unboxing caveats discussed above.
- **2)** Configuring your IDE to pick up auto boxing and unboxing error. For example, in **eclipse**

```
1 Java --> Compiler --> Errors/Warnings --> "Potent
```

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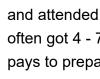
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Arulkumaran Kumaraswamipillai



Mechanical Eng to freelance Java developer in 3 yrs. Contracting since 2003, and attended 150+ Java job interviews, and often got 4 - 7 job offers to choose from. It pays to prepare. So, published Java interview Q&A books via Amazon.com in 2005, and sold 35,000+ copies. Books are outdated and replaced with this subscription based site.

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About Arulkumaran Kumaraswamipillai

Mechanical Eng to freelance Java developer in 3 yrs. Contracting since 2003, and attended 150+ Java job interviews, and often got 4 - 7 job offers

to choose from. It pays to prepare. So, published Java interview Q&A books via Amazon.com in 2005, and sold 35,000+ copies. Books are outdated and replaced with this subscription based site.

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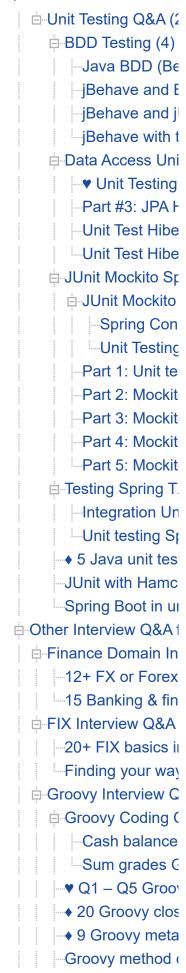
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