

Java Parallel Streams Internals: Order of Results for Collections

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Learning Objectives in this Part of the Lesson

- Understand parallel stream internals, e.g.
 - Know what can change & what can't
 - Splitting, combining, & pooling mechanisms
 - Order of processing
 - Order of results
 - Overview
 - Collections that affect results order



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```
List<Integer> list =  
    Arrays.asList(1, 2, ...);
```

```
Integer[] doubledList = list  
    .parallelStream()  
    .filter(x -> x % 2 == 0)  
    .map(x -> x * 2)  
    .toArray(Integer[]::new);
```

Multiple examples are analyzed in detail

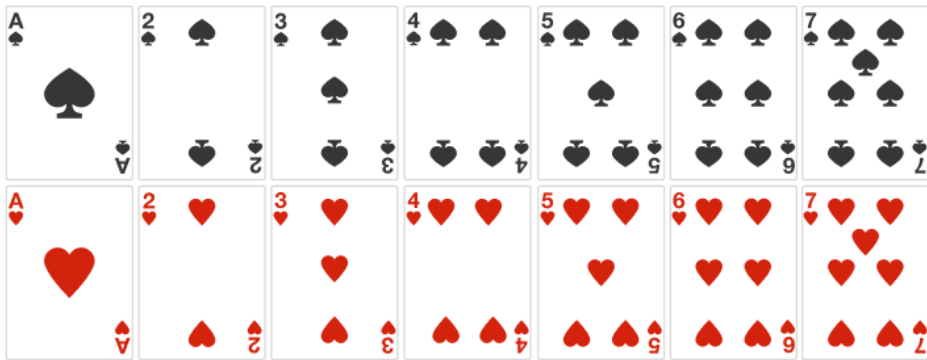
Collections that Affect Results Order

Collections that Affect Results Order

- Encounter order is maintained by
 - Ordered spliterators
 - Ordered collections
 - Static stream factory methods

```
List<Integer> list = Arrays  
    .asList(2, 3, 1, 4, 2);
```

```
Integer[] doubledList = list  
    .parallelStream()  
    .filter(x -> x % 2 == 0)  
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```



See www.lambdafaq.org/in-what-order-do-the-elements-of-a-stream-become-available

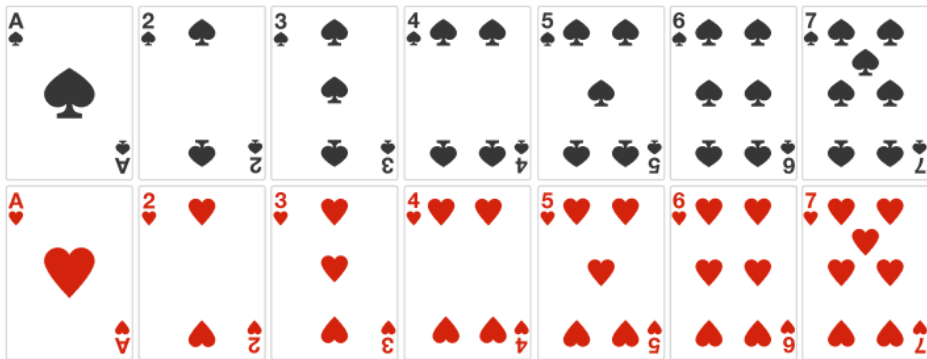
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```
List<Integer> list = Arrays  
    .asList(2, 3, 1, 4, 2);
```

*The encounter order is [2, 3, 1, 4, 2]
since list is ordered & non-unique*

```
Integer[] doubledList = list  
    .parallelStream()  
    .filter(x -> x % 2 == 0)  
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```



Recall that "ordered" isn't the same as "sorted"!

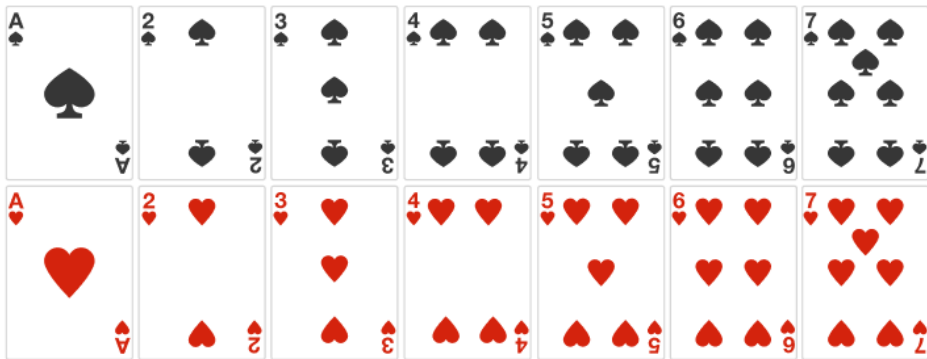
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List<Integer> list = Arrays  
    .asList(2, 3, 1, 4, 2);
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Integer[] doubledList = list  
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```

Only even values continue thru stream



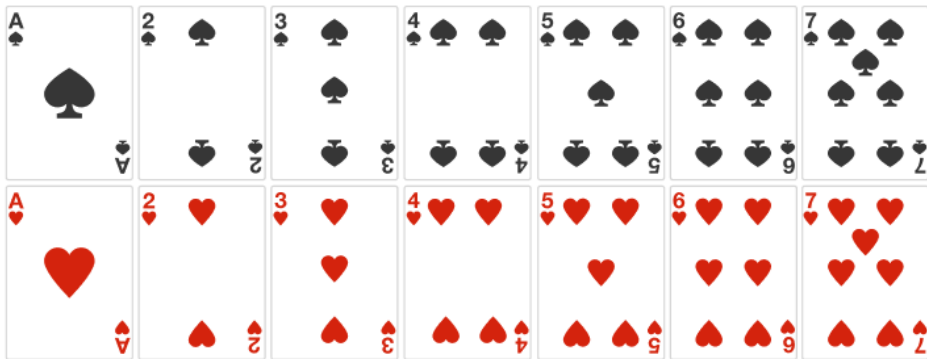
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List<Integer> list = Arrays  
    .asList(2, 3, 1, 4, 2);
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Integer[] doubledList = list  
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```

Multiply each even number by 2



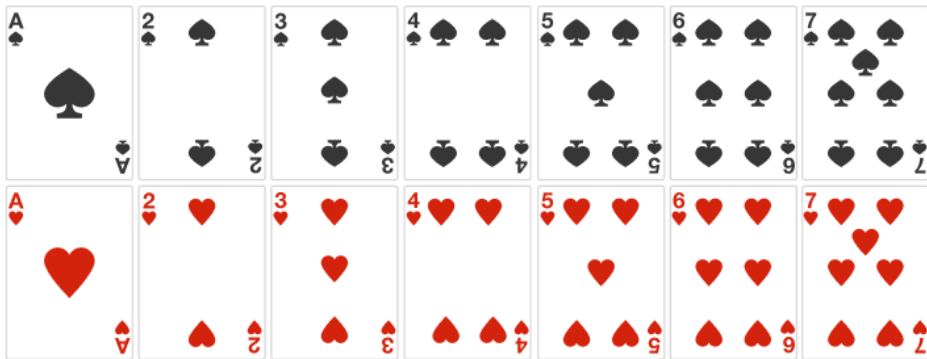
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Convert stream into an array of integers



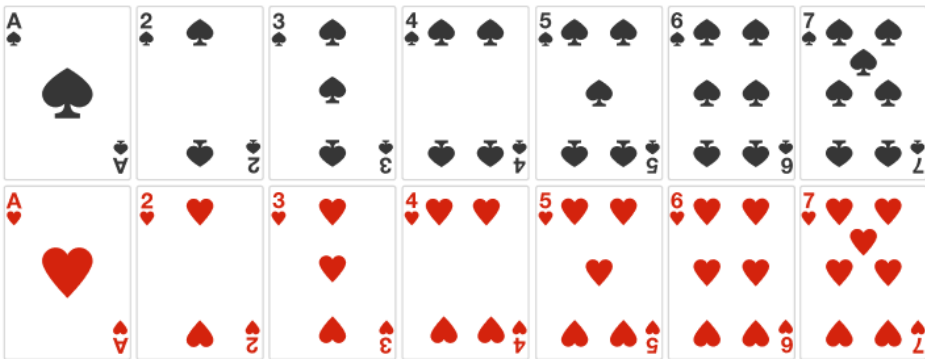
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```
Integer[] doubledList = list  
    .parallelStream()  
    .filter(x -> x % 2 == 0)  
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```

Result **must** be ordered as [4, 8, 4]
since the list is an ordered collection

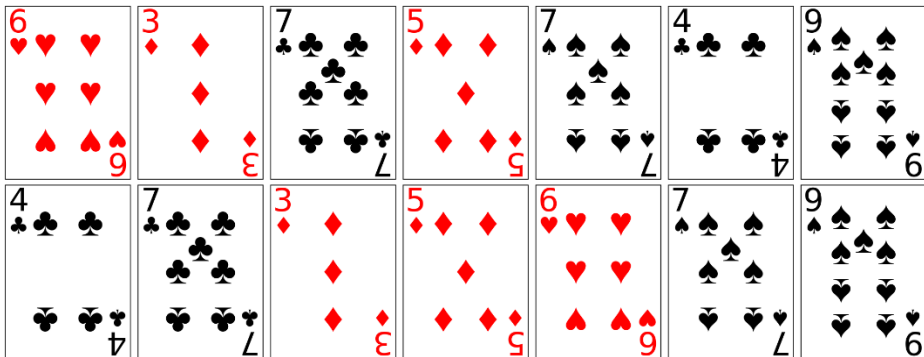


Collections that Affect Results Order

- Unordered collections don't need to respect encounter order

```
Set<Integer> set = new  
    HashSet<>(Arrays.asList  
        (2, 3, 1, 4, 2))
```

```
Integer[] doubledSet = set  
    .parallelStream()  
    .filter(x -> x % 2 == 0)  
    .map(x -> x * 2)  
    .toArray(Integer[]::new);
```



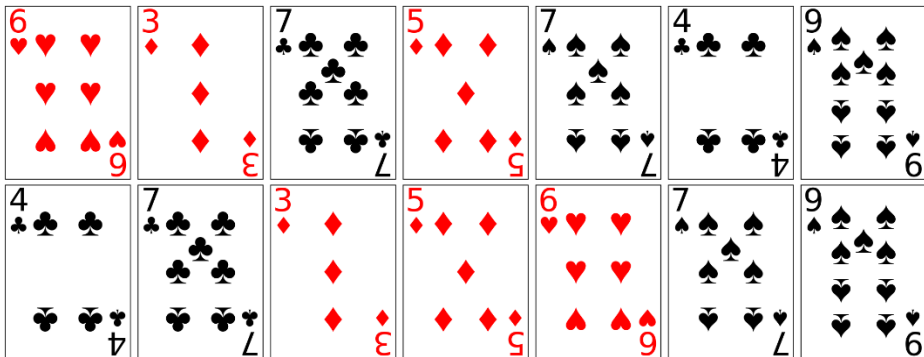
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- Unordered collections don't need to respect encounter order

```
Set<Integer> set = new  
    HashSet<>(Arrays.asList  
        (2, 3, 1, 4, 2));
```

A HashSet is unordered & unique

```
Integer[] doubledSet = set  
    .parallelStream()  
    .filter(x -> x % 2 == 0)  
    .map(x -> x * 2)  
    .toArray(Integer[]::new);
```



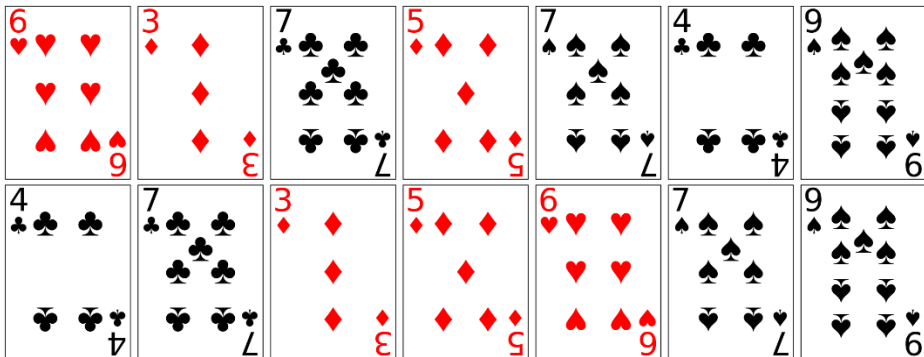
Collections that Affect Results Order

- Unordered collections don't need to respect encounter order

This code runs faster since encounter order need not be maintained in the results, which could be [8, 4] or [4, 8]

```
Set<Integer> set = new  
    HashSet<>(Arrays.asList  
        (2, 3, 1, 4, 2));
```

```
Integer[] doubledSet = set  
    .parallelStream()  
    .filter(x -> x % 2 == 0)  
    .map(x -> x * 2)  
    .toArray(Integer[]::new);
```



End of Java Parallel Streams Internals: Order of Results for Collections