Java Parallel Streams Internals: Order of Results (Part 2)

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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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    - Order of results
      - Overview
      - Collections that affect results order

```
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

See github.com/douglascraigschmidt/LiveLessons/tree/master/Java8/ex21

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);
```

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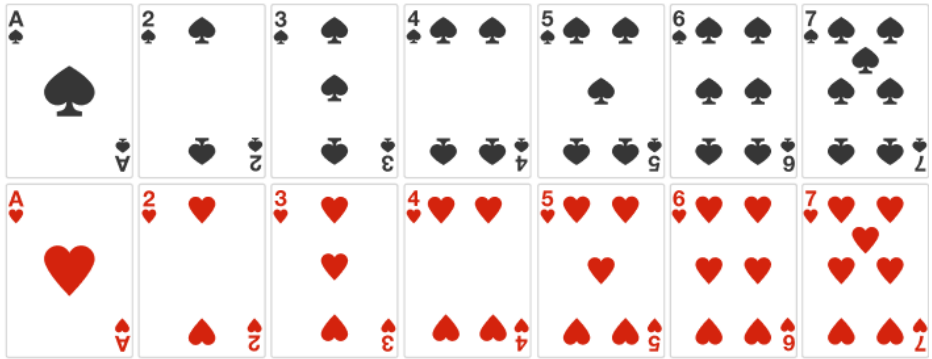
```



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

Collections that Affect Results Order

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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

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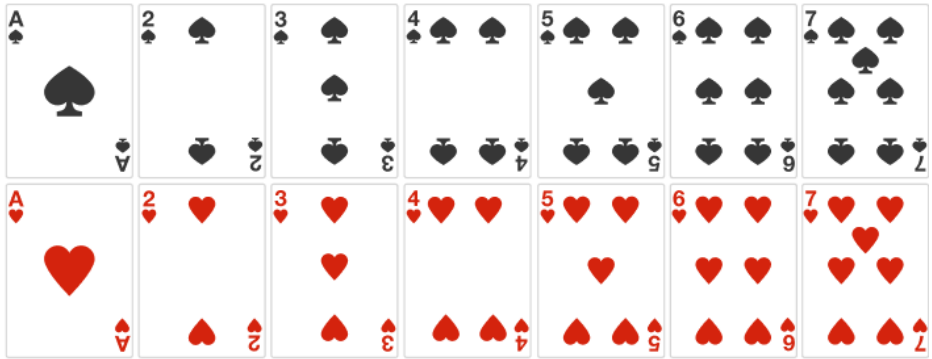

Recall that "ordered" isn't the same as "sorted"!

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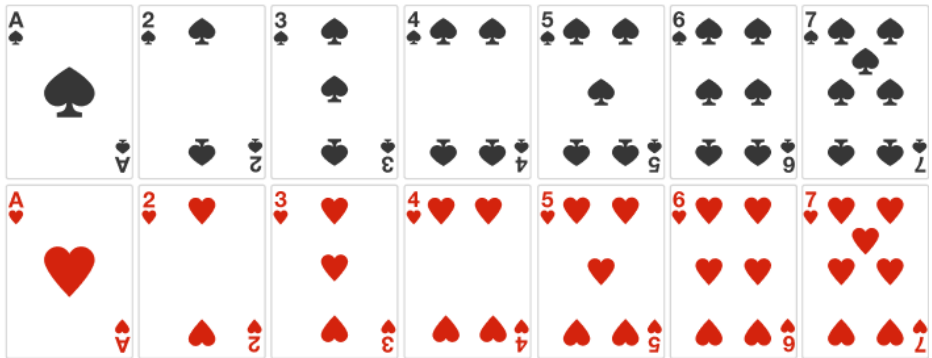
Only even values continue thru stream



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List<Integer> list = Arrays
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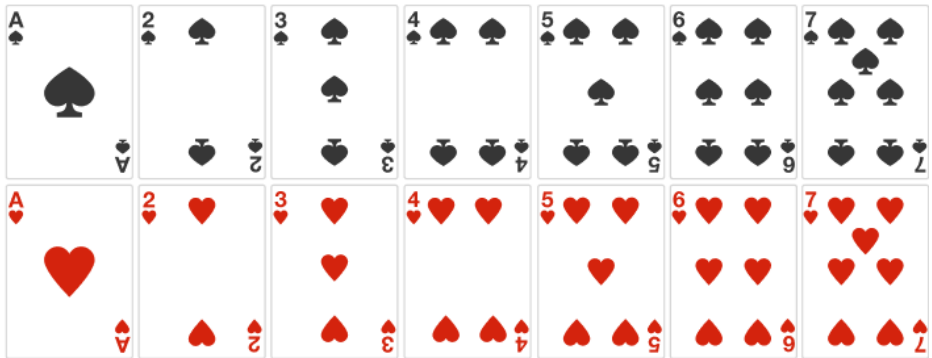
Multiply each even number by 2



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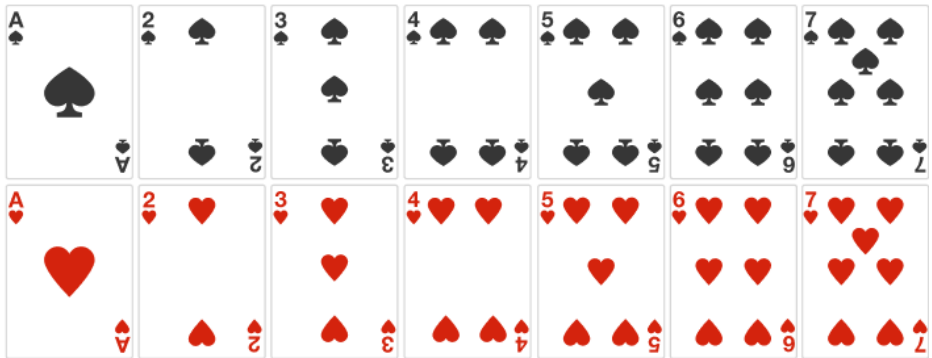
Convert stream into an array of integers



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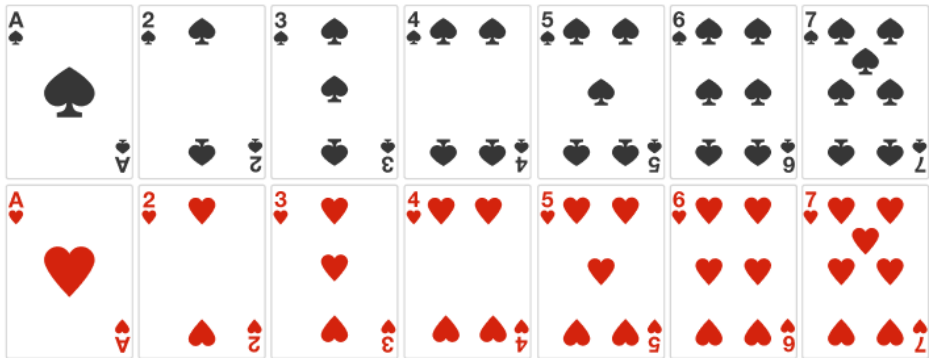


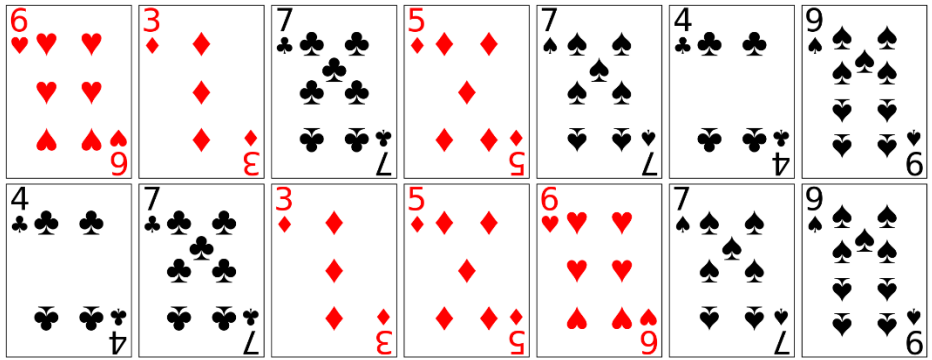
*Tesult **must** be ordered as [4, 8, 4] since the list is an ordered collection*

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);
```



Collections that Affect Results Order

- Unordered collections don't need to respect encounter order

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

A HashSet is unordered & unique

```
Integer[] doubledSet = set
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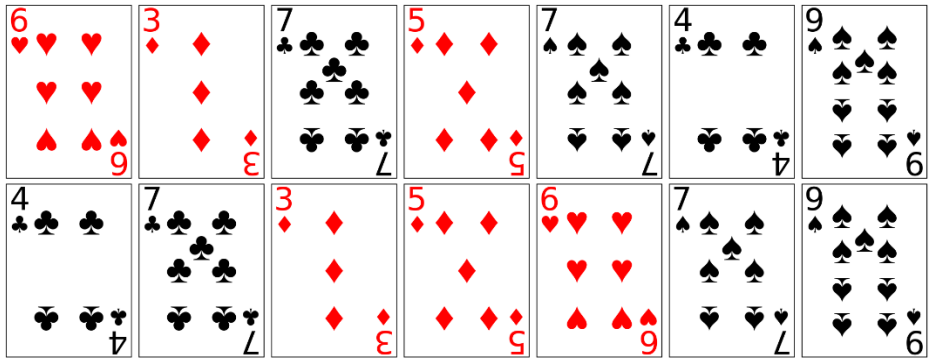

Collections that Affect Results Order

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

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

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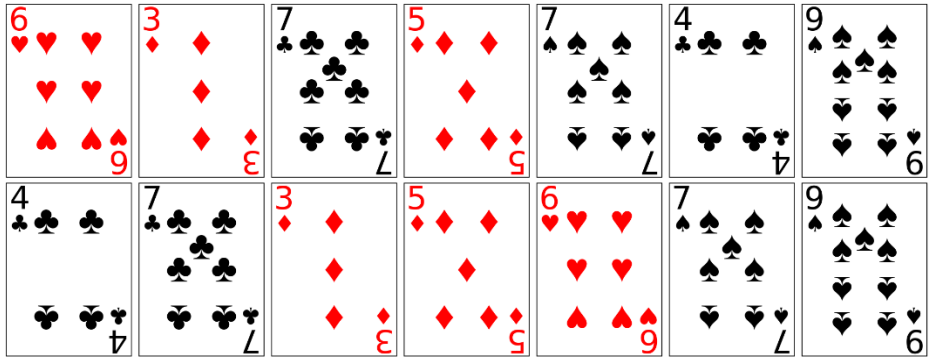

End of Java Parallel Stream Internals: Order of Results (Part 2)