Overview of Java's Supported Programming Paradigms

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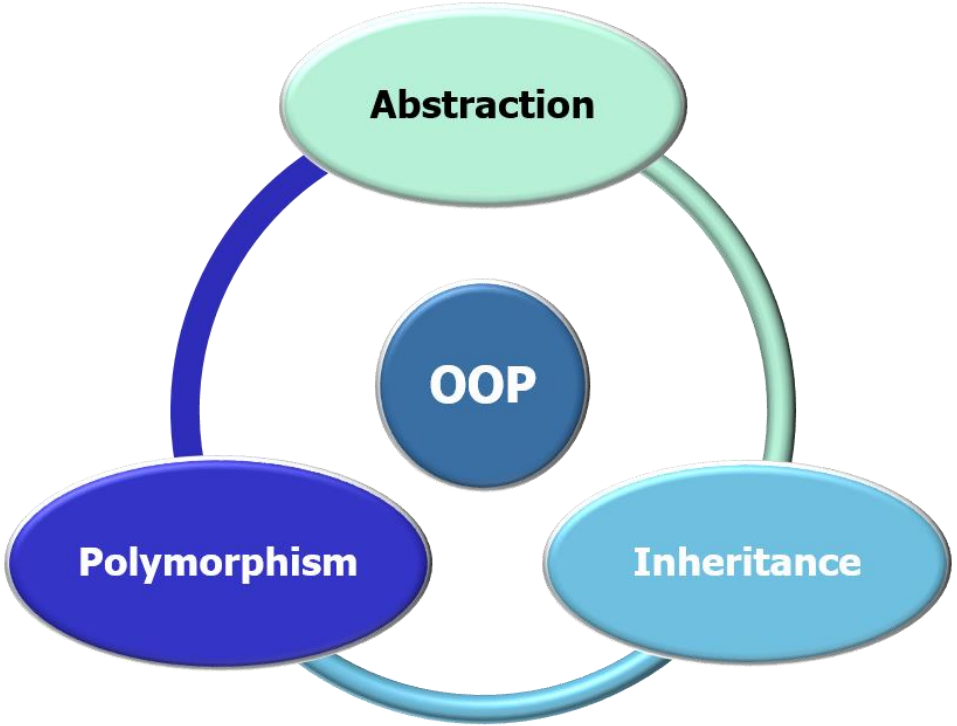
Learning Objectives in this Lesson

- Recognize the two programming paradigms supported by modern Java

Naturally, these paradigms are also supported in versions above & beyond Java 8!

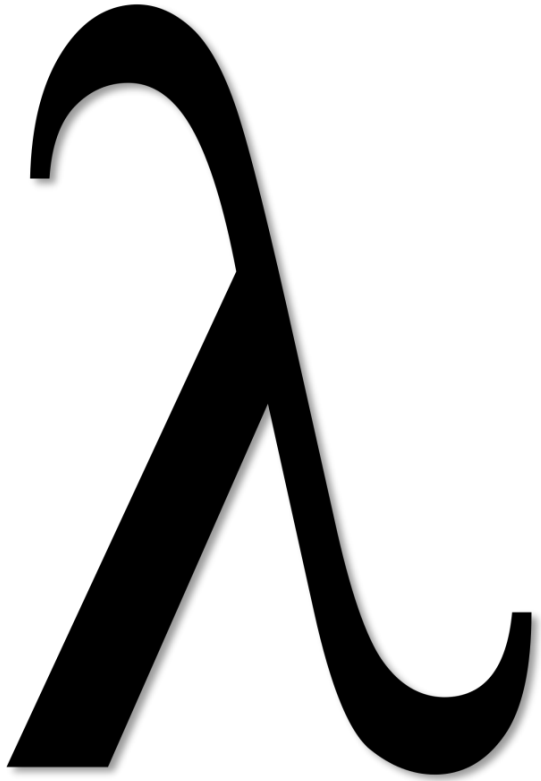
Learning Objectives in this Lesson

- Recognize the two programming paradigms supported by modern Java
  - Object-oriented programming



Learning Objectives in this Lesson

- Recognize the two programming paradigms supported by modern Java
  - Object-oriented programming
  - Functional programming



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  - Object-oriented programming
  - Functional programming

We show some modern Java code fragments that we'll cover in more detail later

Overview of Programming Paradigms in Modern Java

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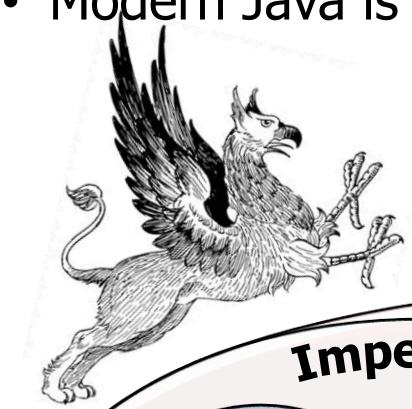
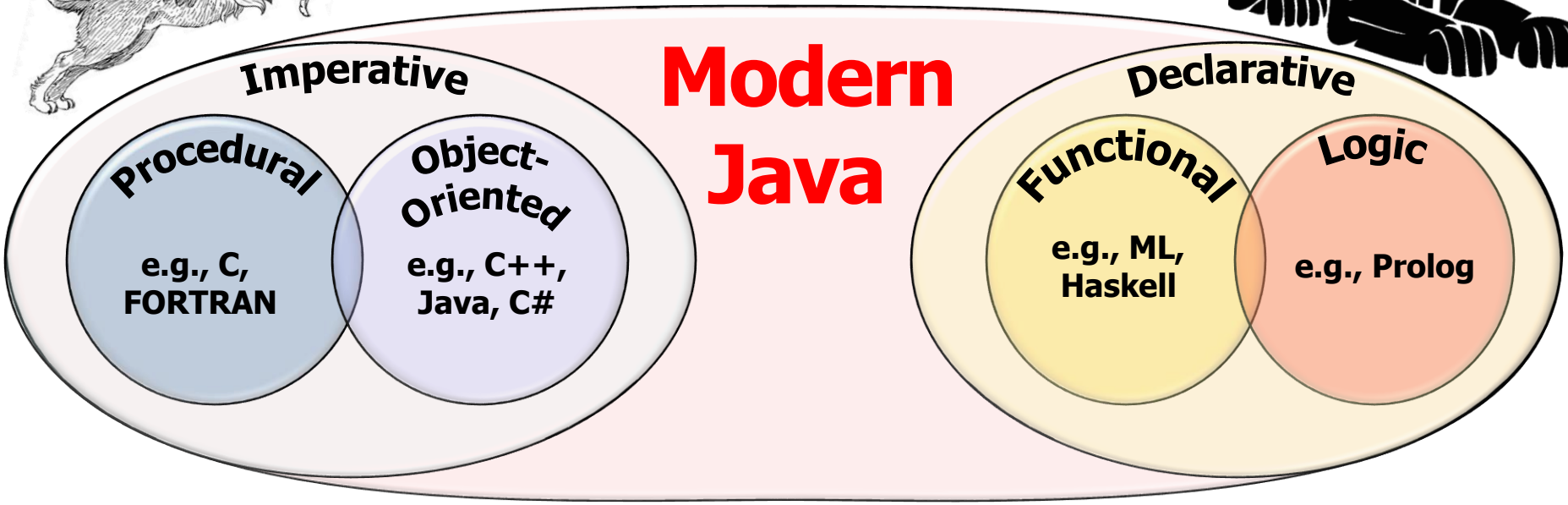
- Modern Java is a "hybrid" combining object-oriented & functional paradigms

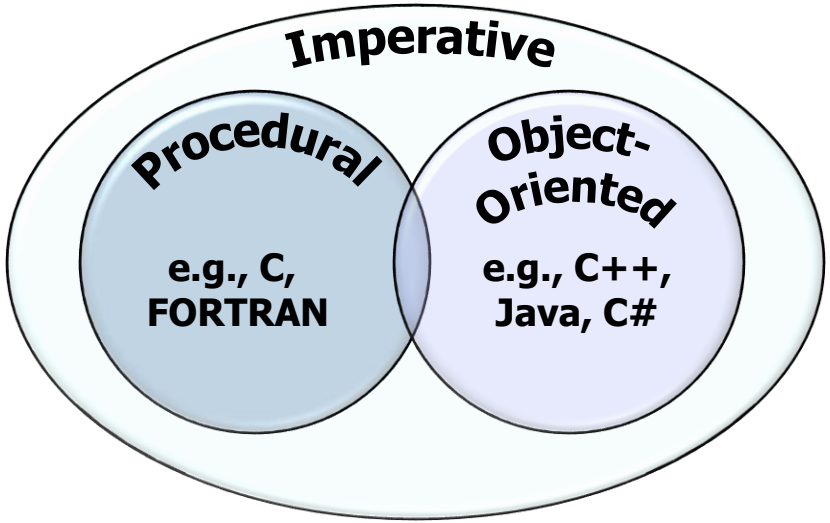




See www.deadcoderising.com/why-you-should-embrace-lambdas-in-java-8

Overview of Programming Paradigms in Modern Java

- Object-oriented programming is an "imperative" paradigm

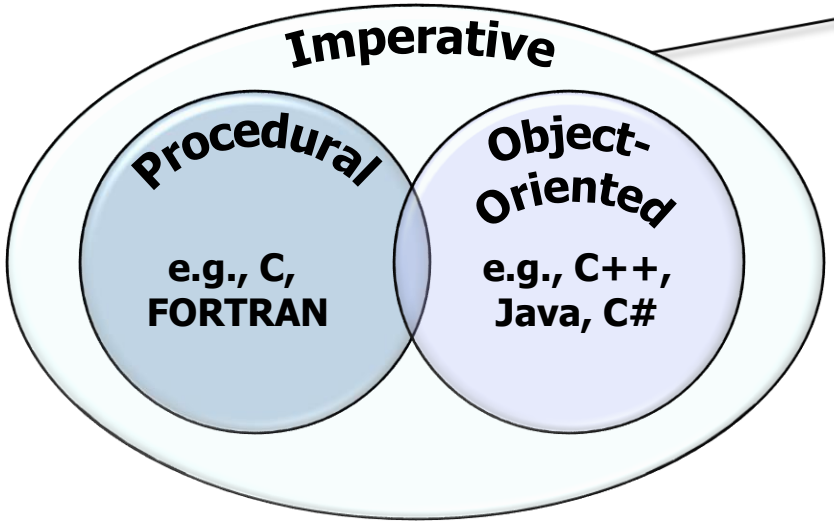


See en.wikipedia.org/wiki/Imperative_programming

Overview of Programming Paradigms in Modern Java

- Object-oriented programming is an "imperative" paradigm
  - e.g., a program consists of commands for the computer to perform

Imperative programming focuses on describing how a program operates via statements that change its state



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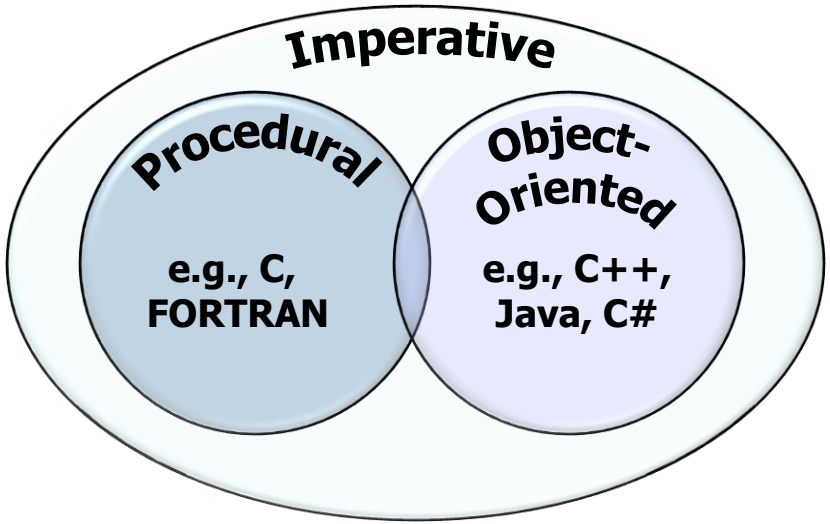


```
List<String> zap(List<String> lines,
                 String omit) {
  List<String> res =
    new ArrayList<>();
  for (String line : lines)
    if (!omit.equals(line))
      res.add(line);
  return res;
}
```

Imperatively remove a given string from a list of strings

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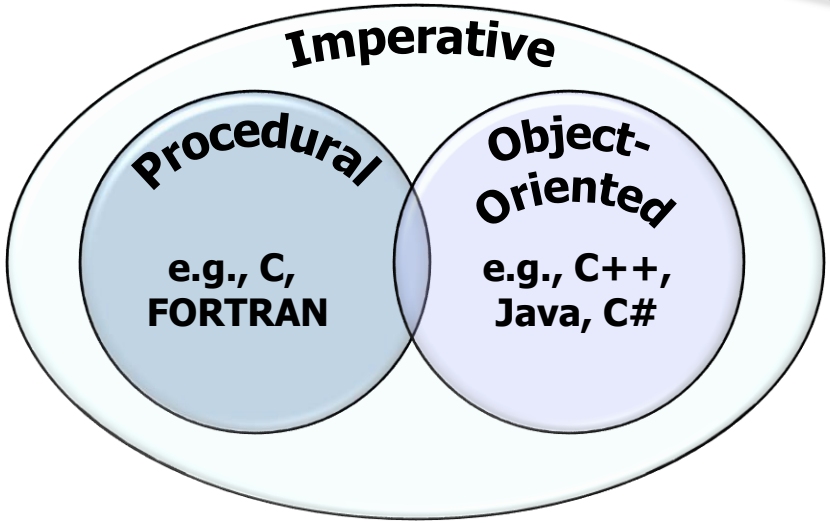
Create an empty list to hold results

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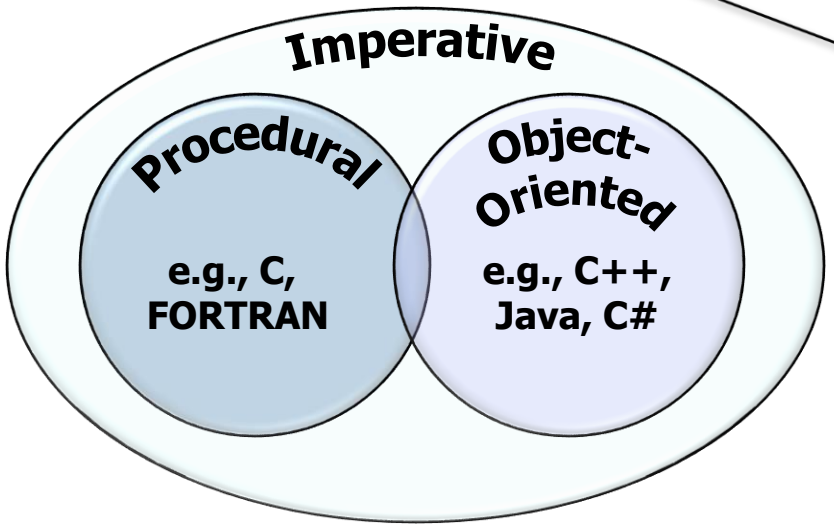
Iterate sequentially through each line

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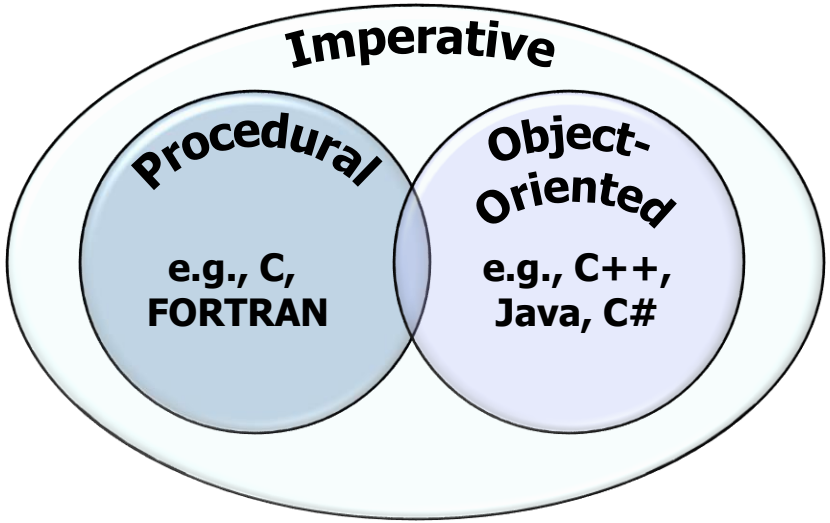


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```

Only add lines that don't match the `omit` *string*

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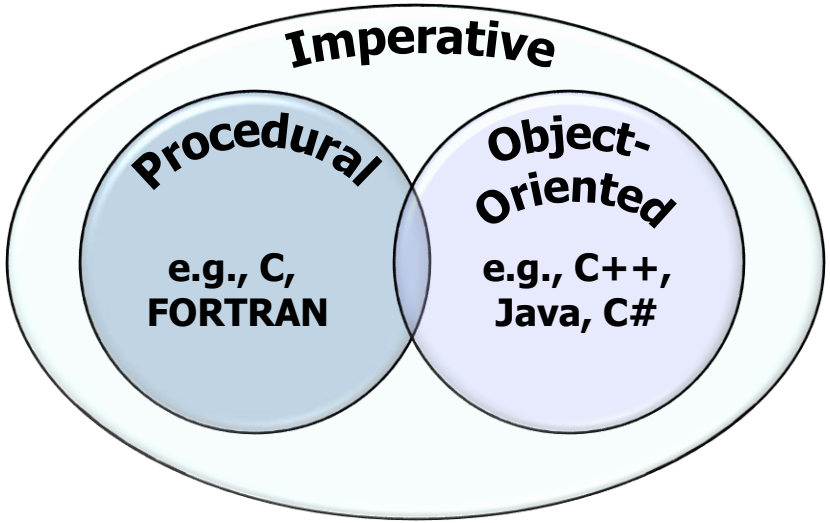


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```

Return the list of non-matching lines

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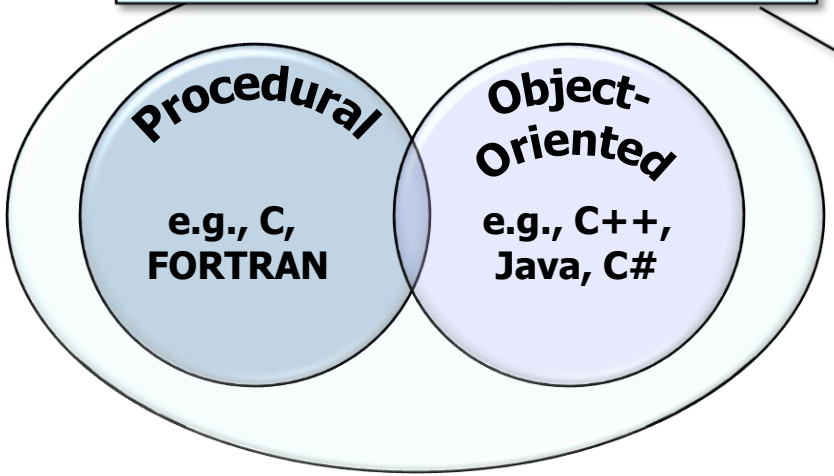
This sequential code applies the Accumulator anti-pattern

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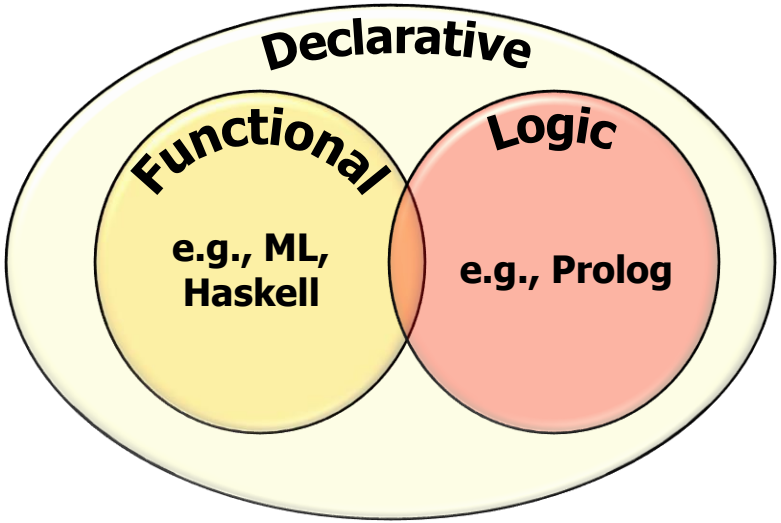
See developer.ibm.com/articles/j-java-streams-2-brian-goetz

Overview of Programming Paradigms in Modern Java

- Conversely, functional programming is a "declarative" paradigm

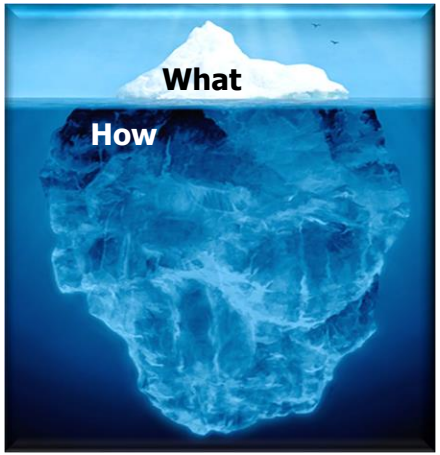


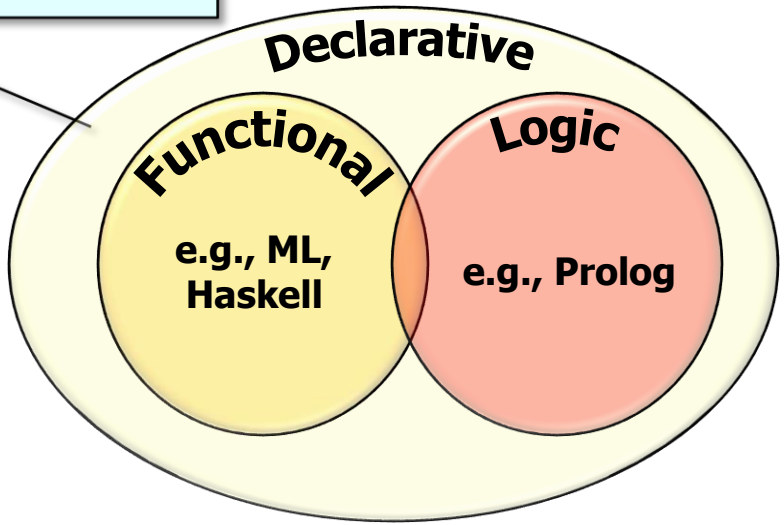
See en.wikipedia.org/wiki/Declarative_programming

Overview of Programming Paradigms in Modern Java

- Conversely, functional programming is a "declarative" paradigm
  - e.g., a program expresses computational logic *without* describing control flow or explicit algorithmic steps

Declarative programming focuses on "what" computations should be performed, instead of on "how" to compute them





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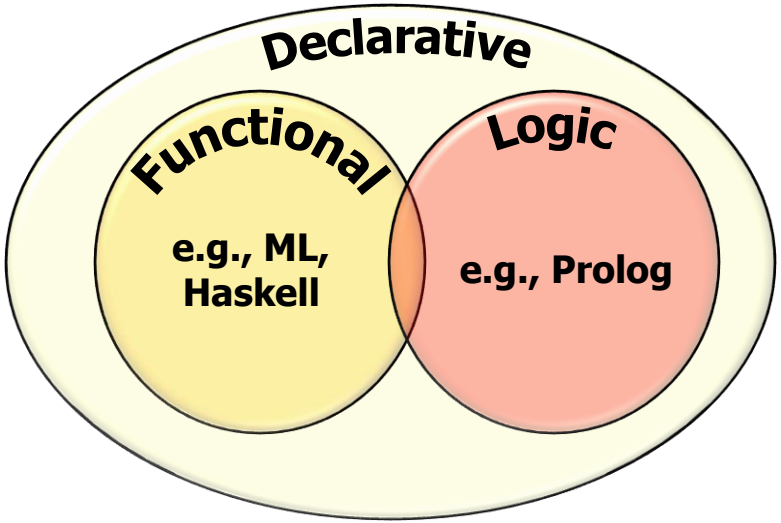
```
List<String> zap(List<String> lines,
                 String omit) {
  return lines
    .stream()
    .filter(not(omit::equals))
    .collect(toList());
}
```

Declaratively remove a given string from a list of strings



See github.com/douglascraigschmidt/LiveLessons/tree/master/Java8/ex0

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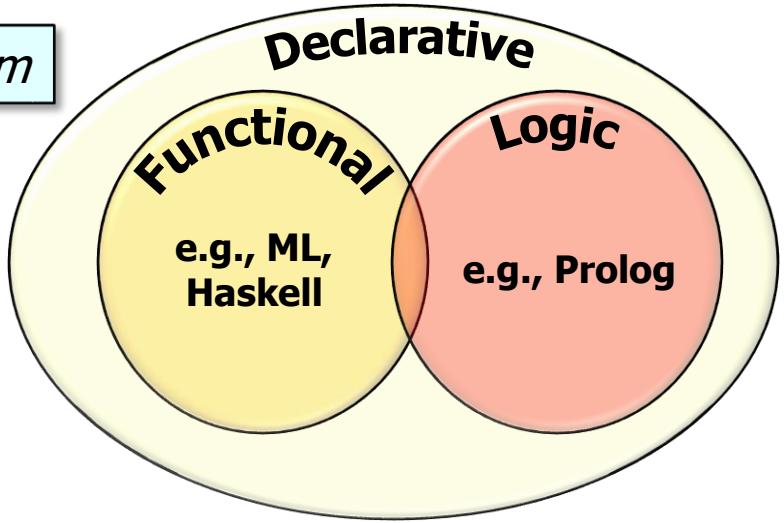
```

Convert list into a stream



See docs.oracle.com/javase/tutorial/collections/streams

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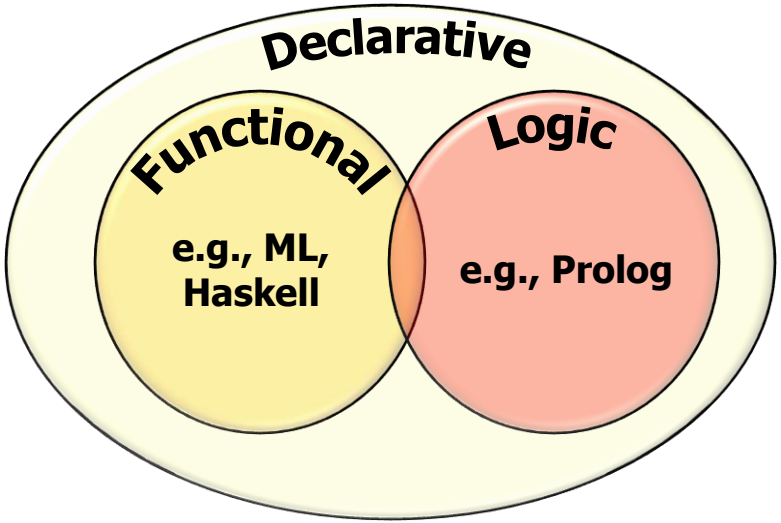
}
```

Remove any line in the stream that matches the `omit` *param*



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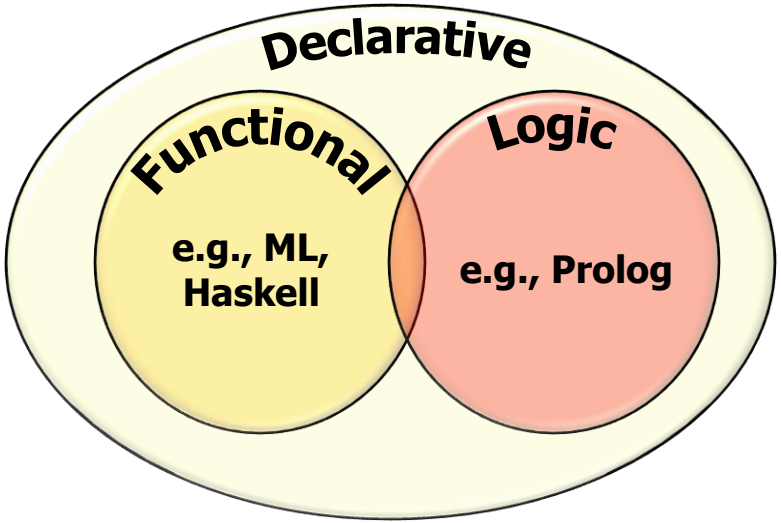
Collect all non-matching lines into a list & return it the caller



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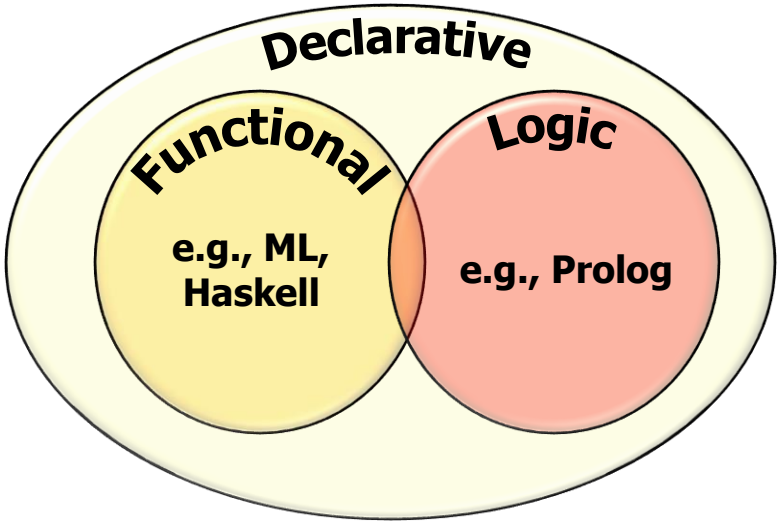
Note "fluent" programming style with cascading method calls



See en.wikipedia.org/wiki/Fluent_interface

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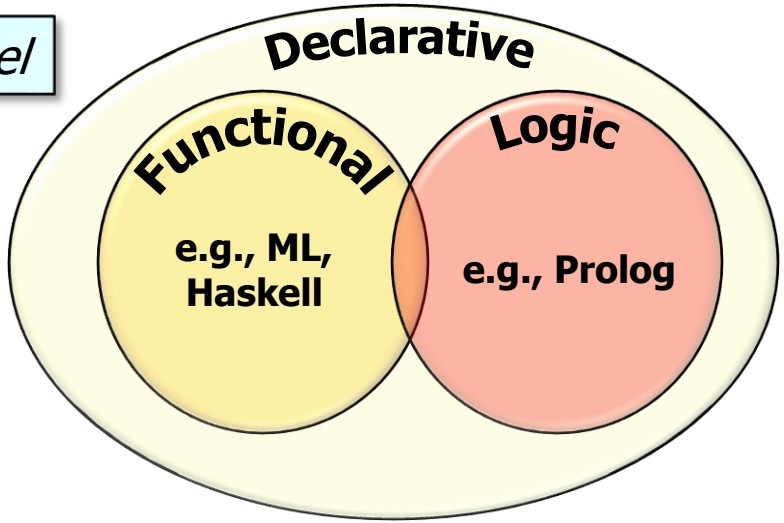
```
List<String> zap(List<String> lines,
                 String omit) {
  return lines
    .parallelStream()
    .filter(not(omit::equals))
    .collect(toList());
}
```

Filter in parallel



See docs.oracle.com/javase/tutorial/collections/streams/parallelism.html

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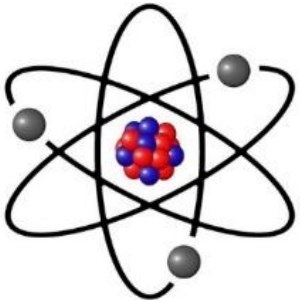
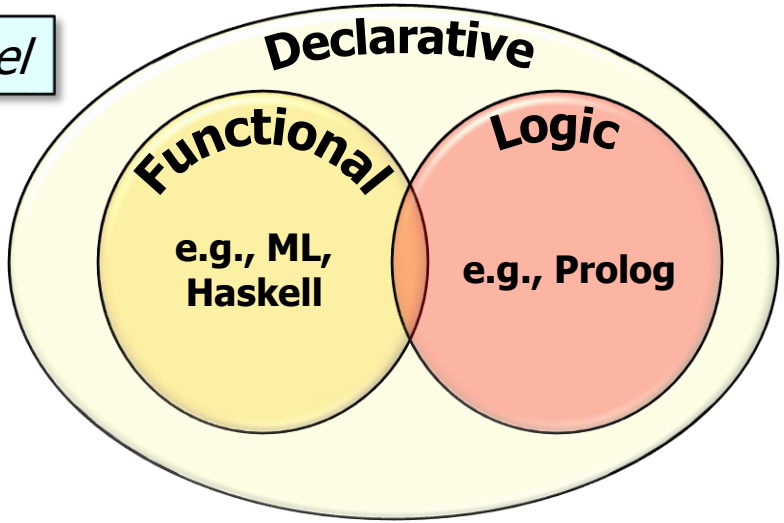
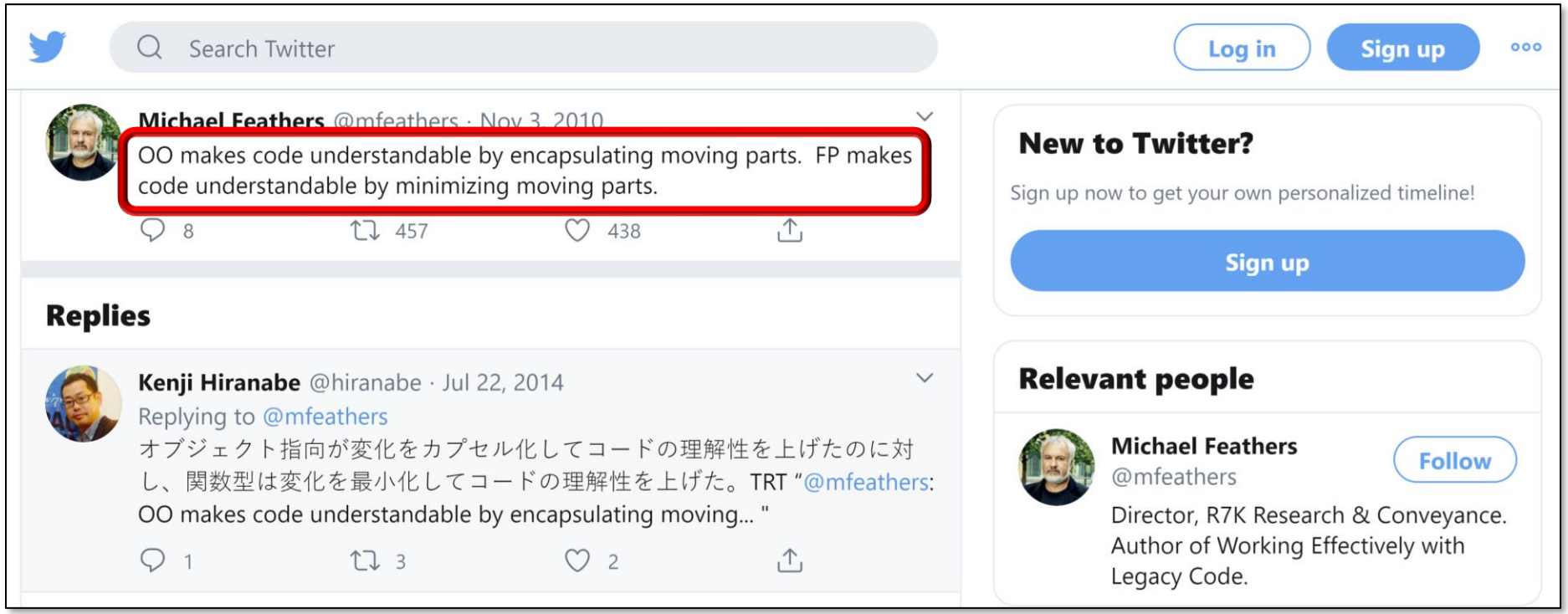




Code was parallelized with minuscule changes since it's declarative & stateless!

Overview of Programming Paradigms in Modern Java

- Summary of these two paradigms



See twitter.com/mfeathers/status/29581296216?lang=en

Overview of Programming Paradigms in Modern Java

- Summary of these two paradigms:
  - Java's object-oriented programming features make code understandable by encapsulating the moving parts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     if (!omit.equals(line))
       res.add(line);
   return res;
}
```

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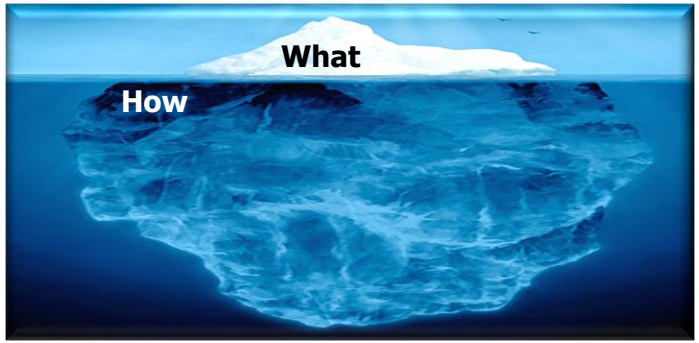
- Summary of these two paradigms:
  - Java's object-oriented programming features make code understandable by encapsulating the moving parts
  - It's functional programming features make code understandable by eliminating the moving parts

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End of Overview of Java's Supported Programming Paradigms