Overview of Spring WebMVC

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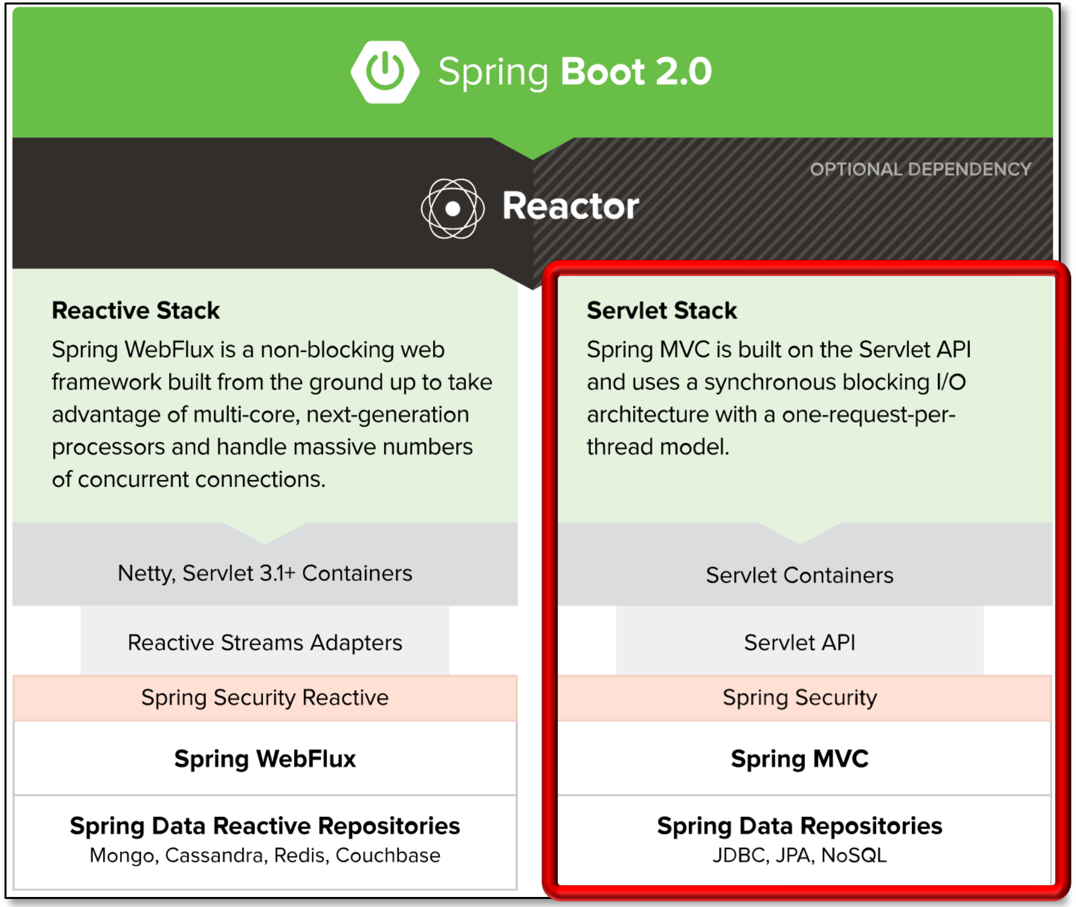
Learning Objectives in this Lesson

- Understand the structure & functionality of the Spring WebMVC framework supported by Spring Boot 2.0



Reactive Stack

Spring WebFlux is a non-blocking web framework built from the ground up to take advantage of multi-core, next-generation processors and handle massive numbers of concurrent connections.

Servlet Stack

Spring MVC is built on the Servlet API and uses a synchronous blocking I/O architecture with a one-request-per-thread model.

See docs.spring.io/spring-framework/docs/3.2.x/spring-framework-reference/html/mvc.html

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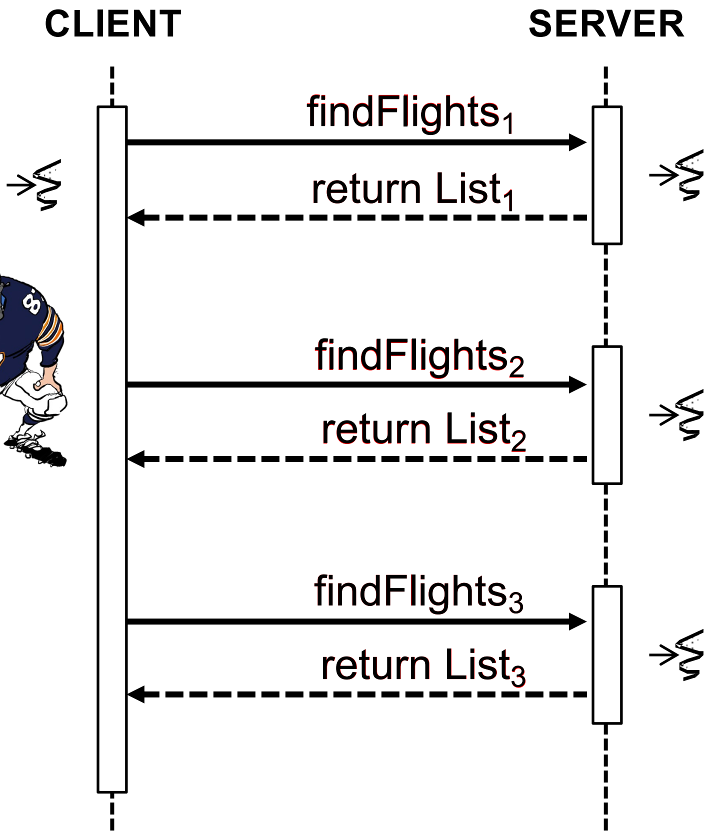
- Understand the structure & functionality of the Spring WebMVC framework supported by Spring Boot 2.0, e.g.
  - Its concurrency model



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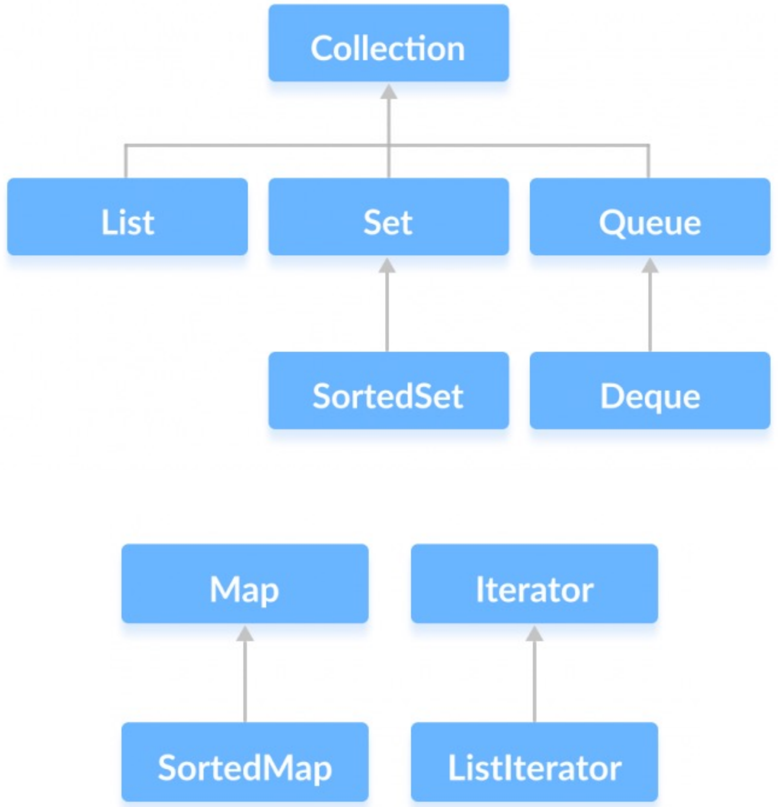
  - Its concurrency model
  - Its communication model



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Monolithic ***vs.*** ***Microservices***

Spring WebMVC supports monolithic- & microservice-based architectures

Overview of Spring WebMVC Concurrency

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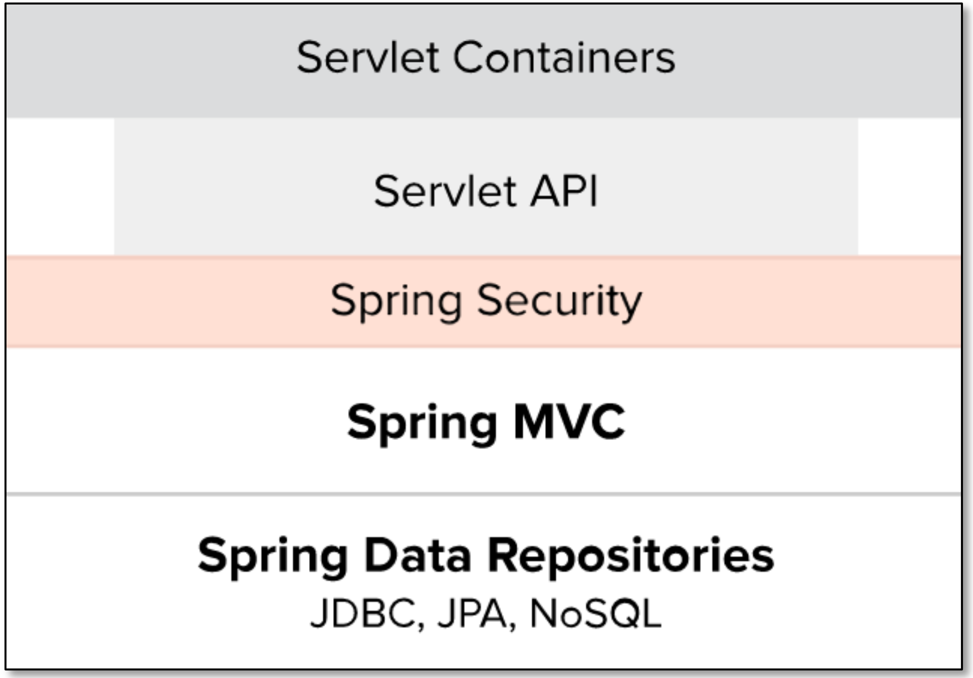

Overview of Spring WebMVC Concurrency

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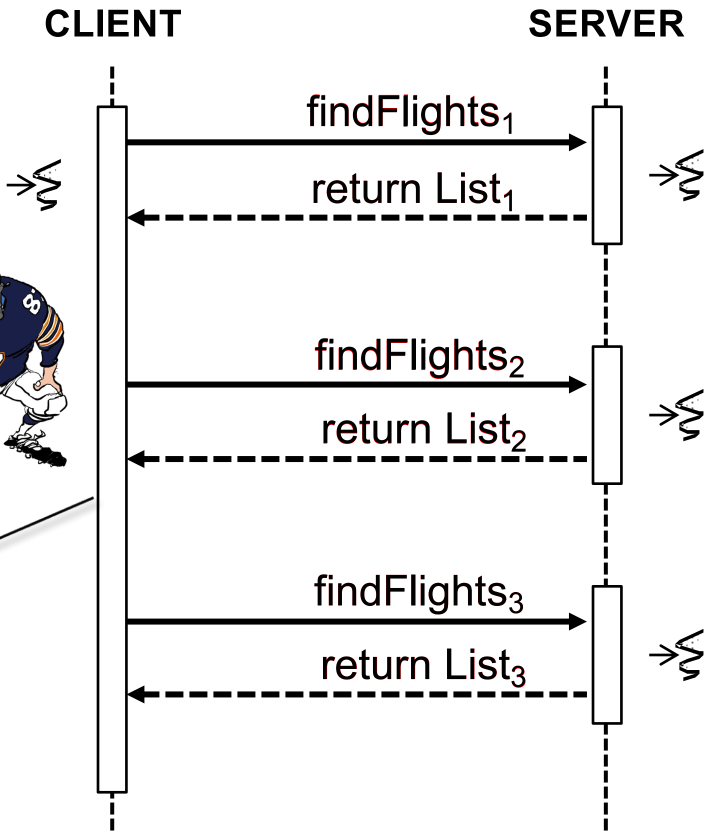
    - Each request is handled by a thread that blocks until it is able to fully process the request



A request to a list of flights from a database over the network might take a few seconds, which blocks threads from servicing other requests & responses

See en.wikipedia.org/wiki/Blocking_(computing)

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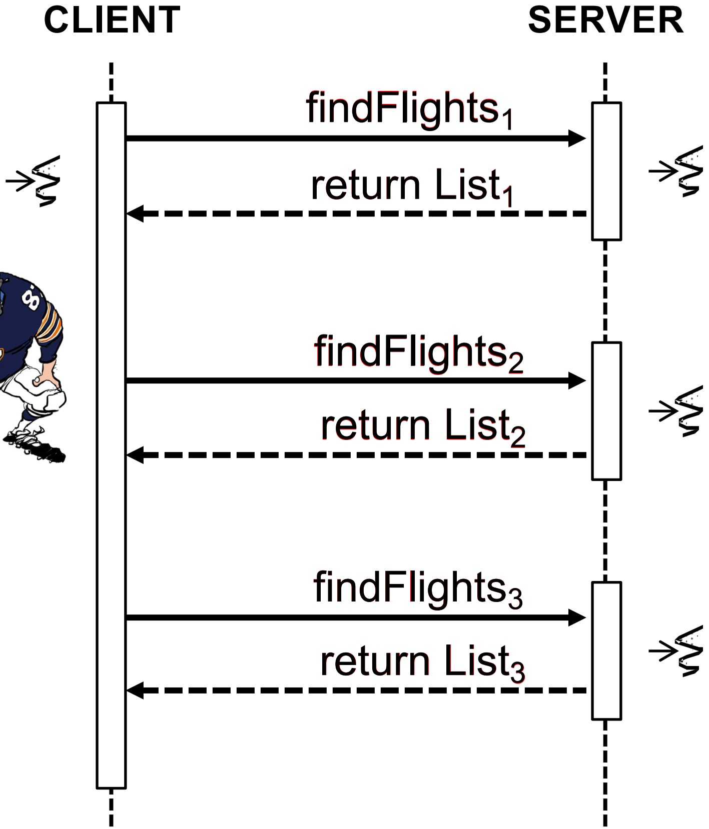
      - Blocking calls are a natural form of back pressure



See medium.com/@jayphelps/backpressure-explained-the-flow-of-data-through-software-2350b3e77ce7

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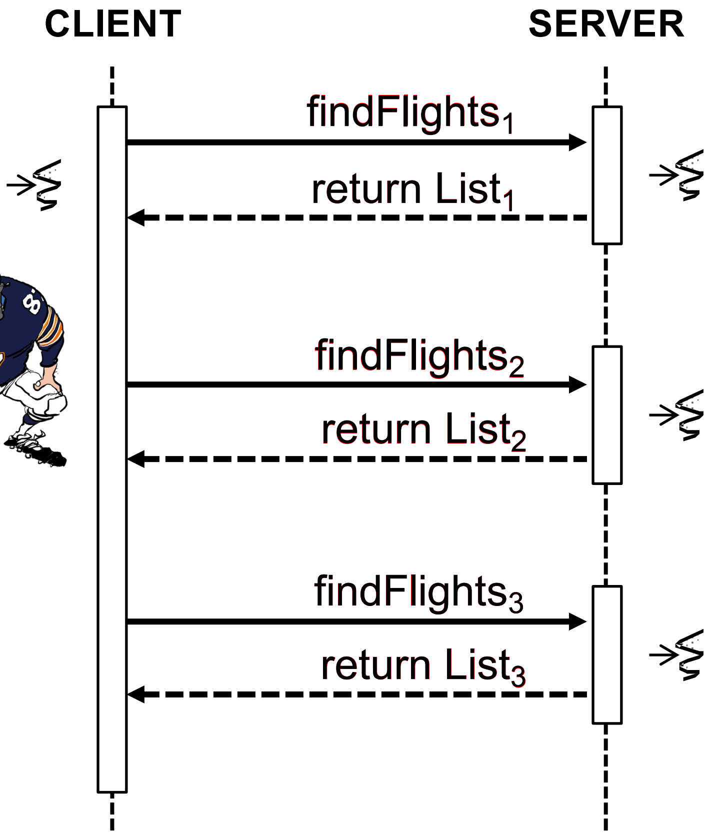
        - Forces the caller to wait



See en.wikipedia.org/wiki/Rate_limiting

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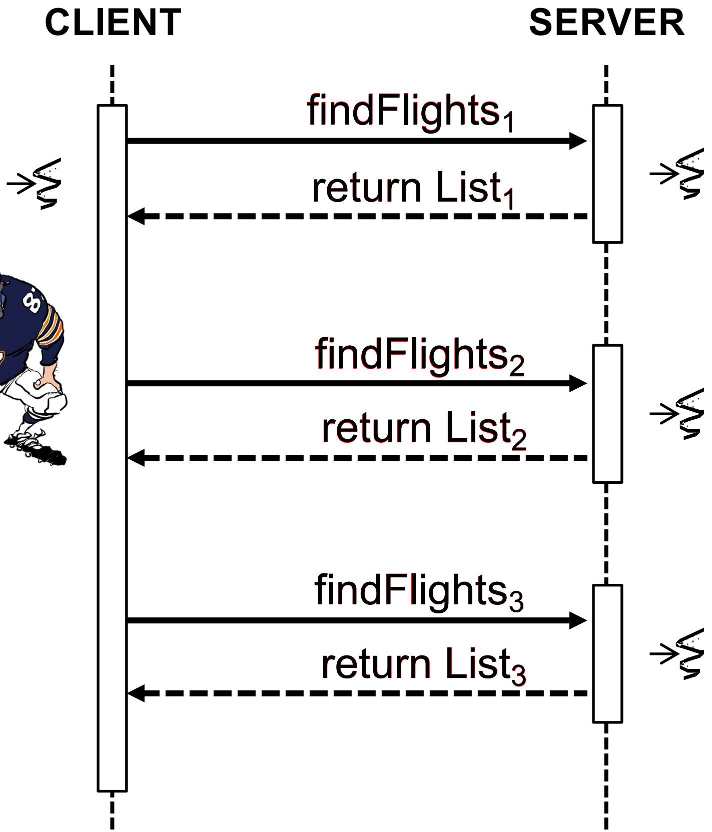
        - Forces the caller to wait
        - Eliminates the need for end-to-end rate control



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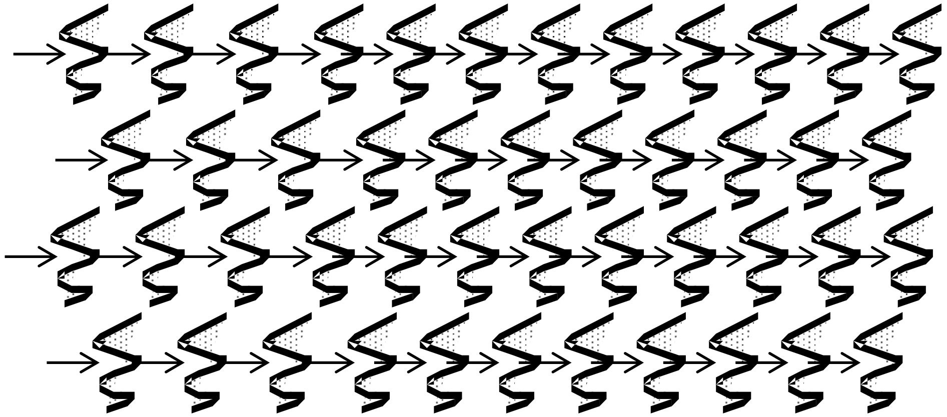

See www.baeldung.com/java-web-thread-pool-config

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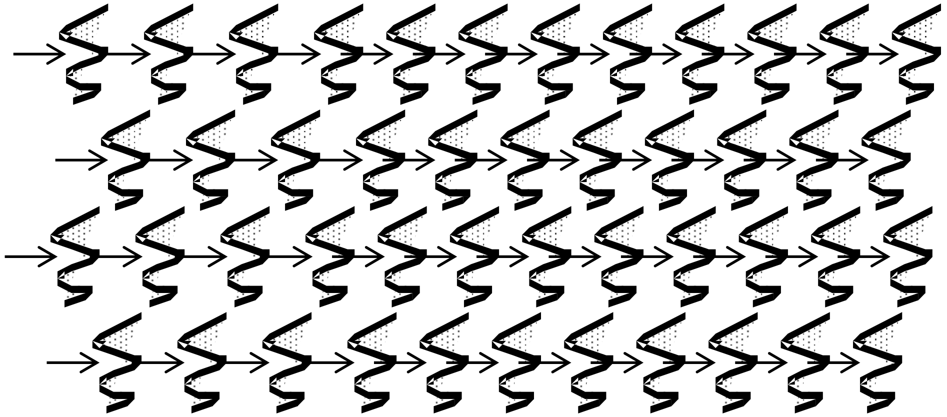
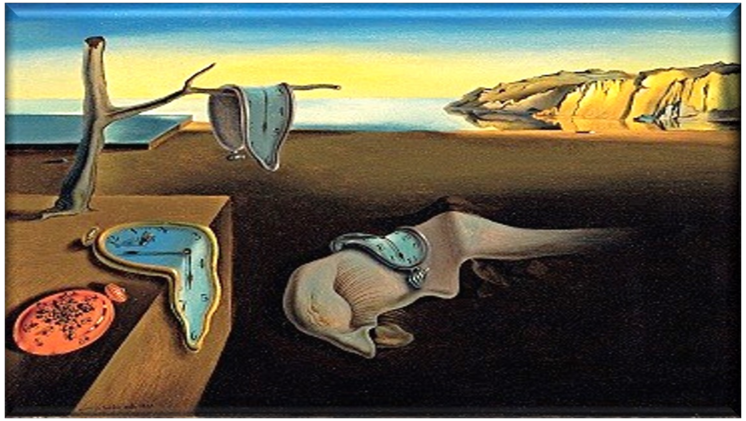
      - Traditional Java Thread objects consume non-trivial system resources..





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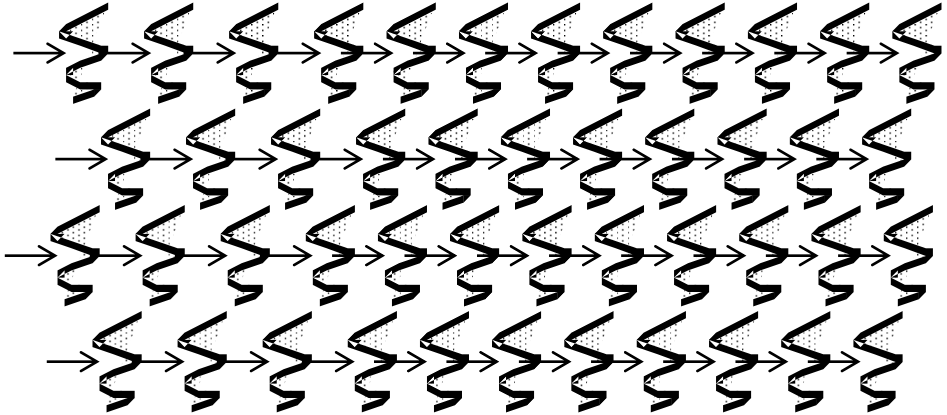
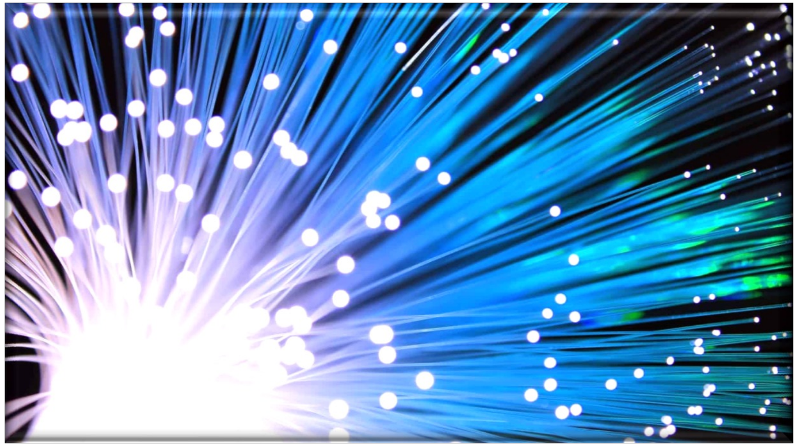
    - Java 19's "virtual threads" provide much more scalability





See www.happycoders.eu/java/virtual-threads

Overview of Spring WebMVC Communications

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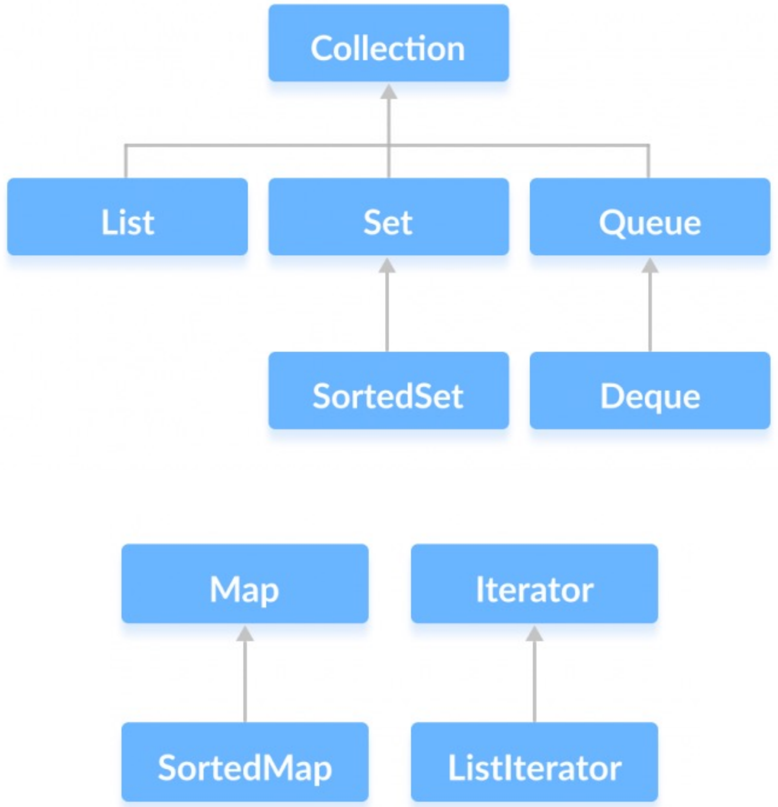
- Spring WebMVC communications
  - Network communication uses common Java types



See docs.oracle.com/javase/8/docs/technotes/guides/collections/overview.html

Overview of Spring WebMVC Communication

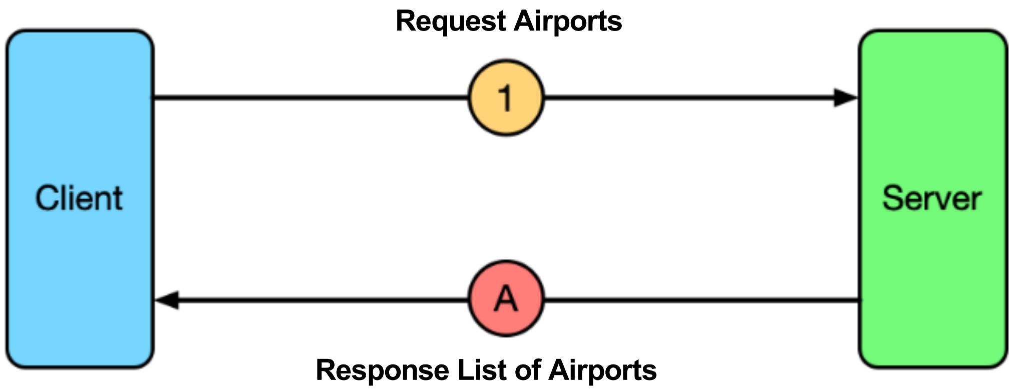
- Spring WebMVC communications
  - Network communication uses common Java types
    - e.g., Java String & Integer objects, as well as List & Map collections

```
public class FlightController {
  ...
  @GetMapping(AIRPORTS)
  List<Airport> getAirports() {
    return flightService
      .getAirports();
  }
  ...
}
```

See [flights-microservices/-/blob/master/src/main/java/server/flight/FlightController.java]()

Overview of Spring WebMVC Communication

- Spring WebMVC communications
  - Network communication uses common Java types
  - WebMVC endpoints send & return Java collections in one fell swoop



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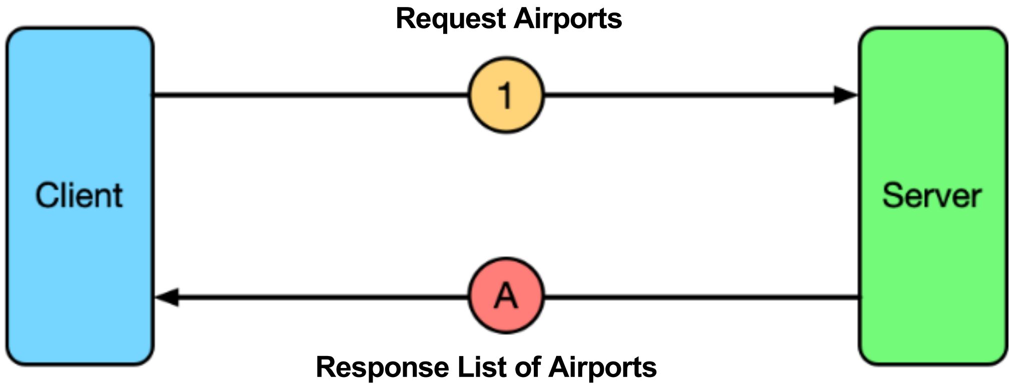
    - Client latency may suffer & thus not be as responsive as possible



See en.wikipedia.org/wiki/Spinning_pinwheel

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- Spring WebMVC communications
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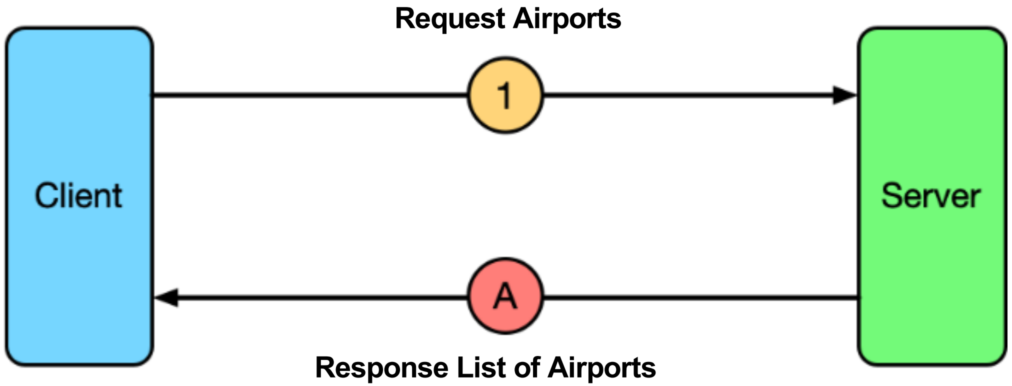
    - Memory is needed to buffer this data at multiple points



See english.stackexchange.com/questions/337497/what-is-meant-by-memory-hog

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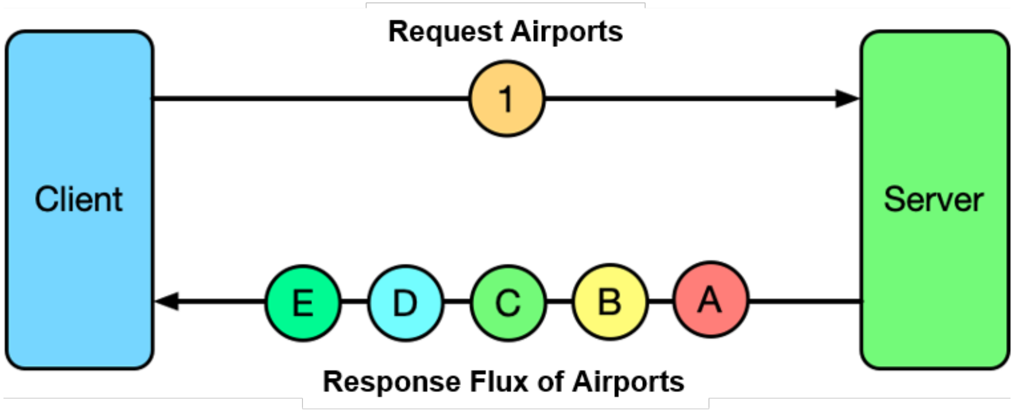
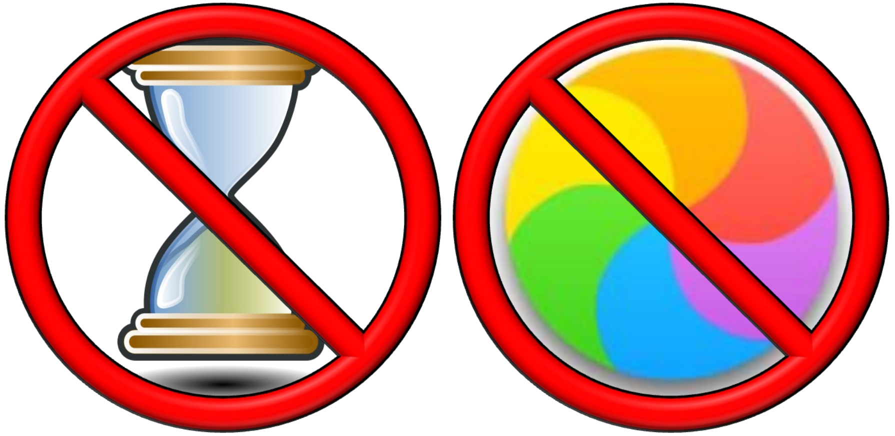
    - Addressed by Spring WebFlux & reactive programming





See docs.spring.io/spring-framework/docs/current/reference/html/web-reactive.html#webflux

End of Overview of Spring WebMVC