Overview of Reactive Programming Principles

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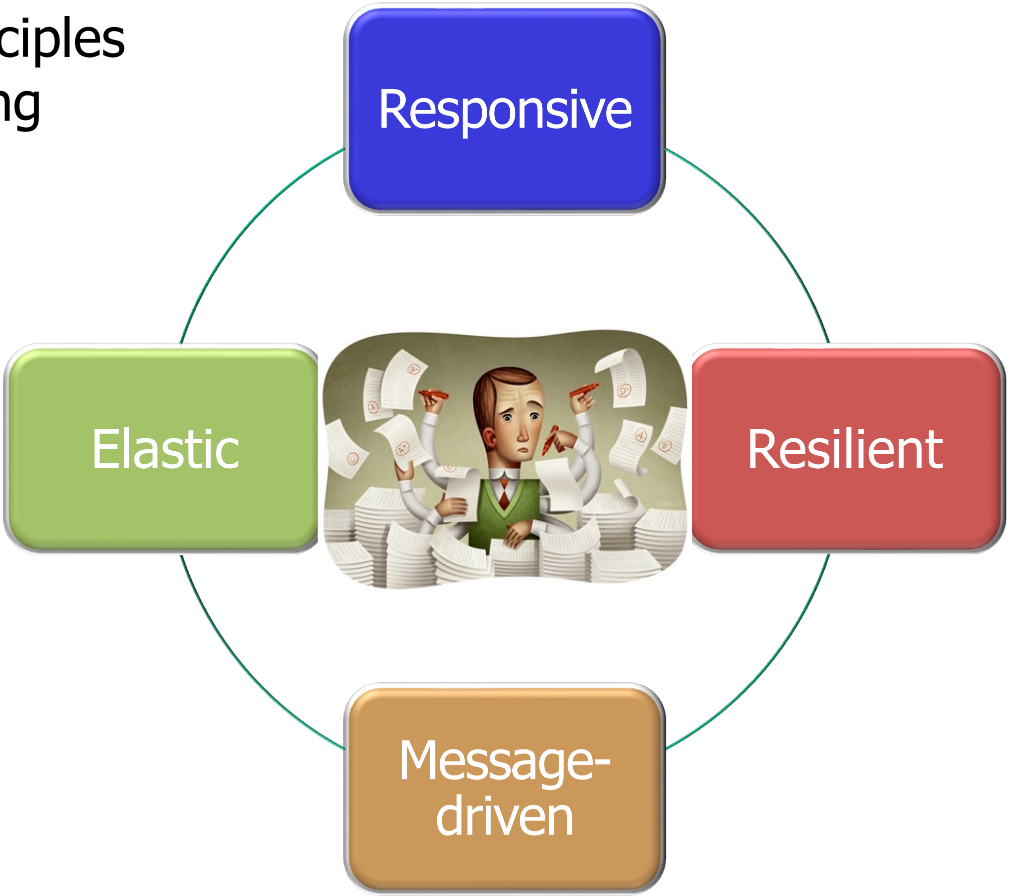
Learning Objectives in this Part of the Lesson

- Understand the key benefits & principles underlying the reactive programming paradigm



See www.reactivemanifesto.org

Overview of Reactive Programming

Overview of Reactive Programming

- Reactive programming is an asynchronous programming paradigm concerned with processing streams of data & propagating changes throughout a stream

See en.wikipedia.org/wiki/Reactive_programming

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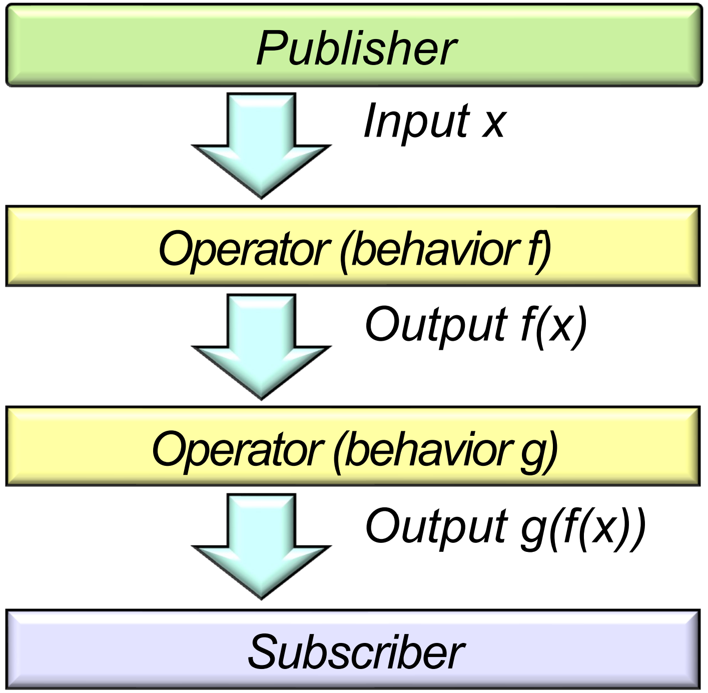
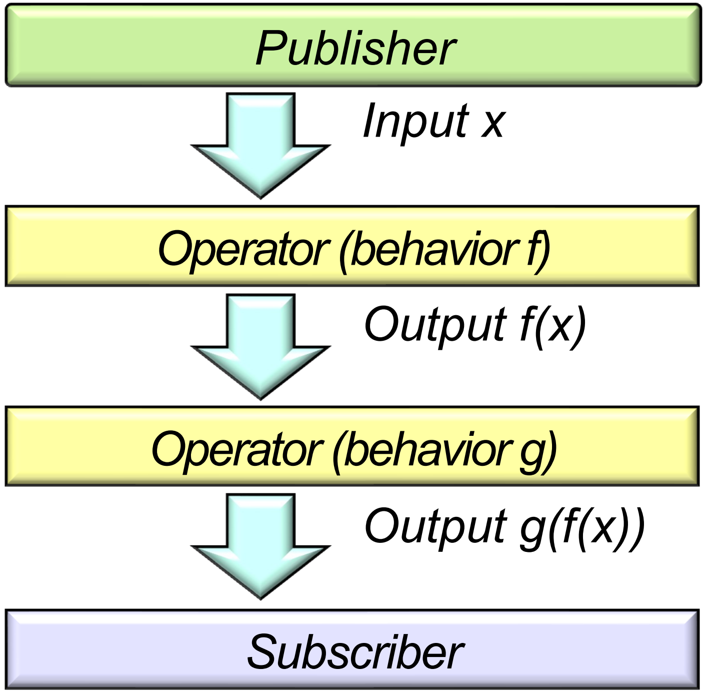
  - It composes asynchronous & event-based sequences using various types of operators



Overview of Reactive Programming

- Reactive programming is an asynchronous programming paradigm concerned with processing streams of data & propagating changes throughout a stream
  - It composes asynchronous & event-based sequences using various types of operators
    - Ideally these operators are non-blocking



See en.wikipedia.org/wiki/Non-blocking_algorithm

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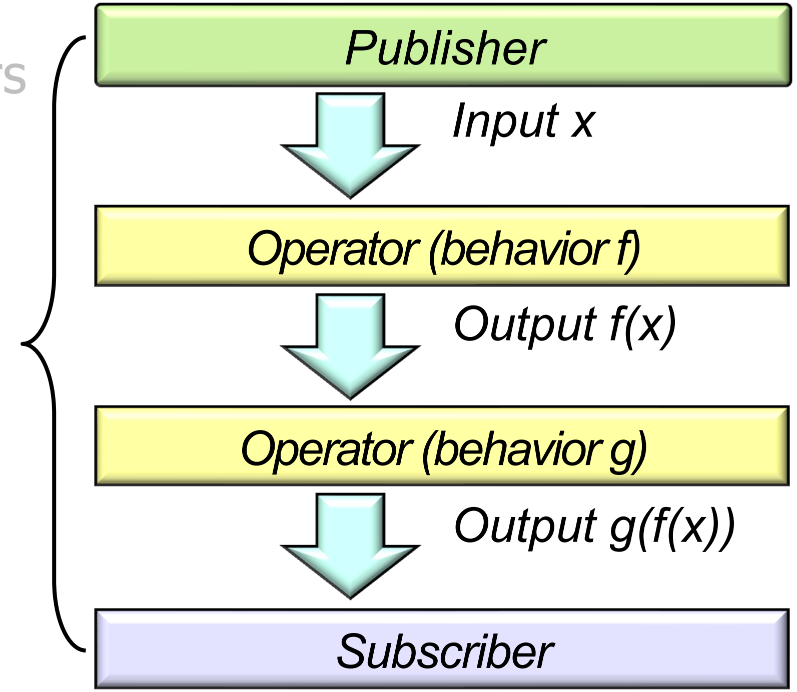
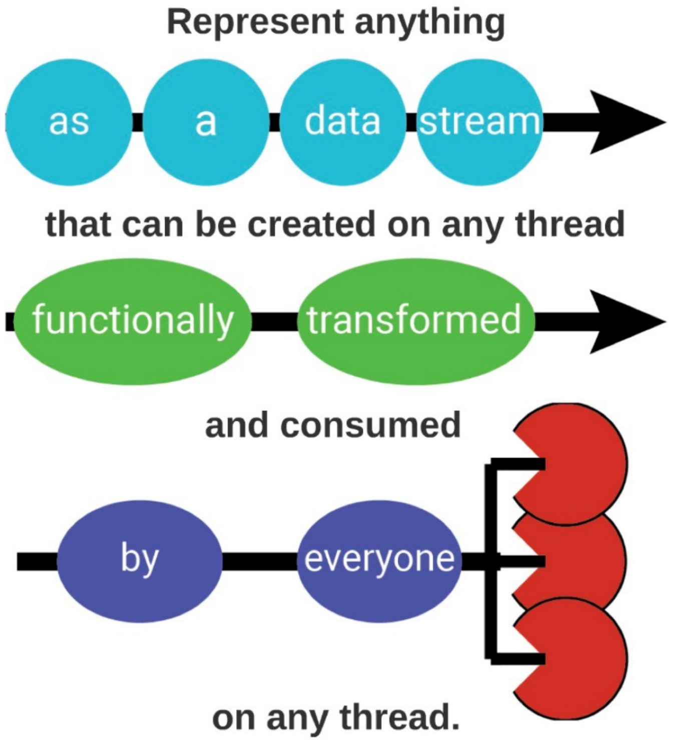
  - It composes asynchronous & event-based sequences using various types of operators
  - These operators can be mapped transparently to one or more threads



See en.wikipedia.org/wiki/Thread_pool

Overview of Reactive Programming

- Reactive programming is an asynchronous programming paradigm concerned with processing streams of data & propagating changes throughout a stream
  - It composes asynchronous & event-based sequences using various types of operators
  - These operators can be mapped transparently to one or more threads
  - Programs designed this way avoid the overhead of constantly starting & stopping many threads



See en.wikipedia.org/wiki/ReactiveX

Overview of Reactive Programming

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  - Processing user events

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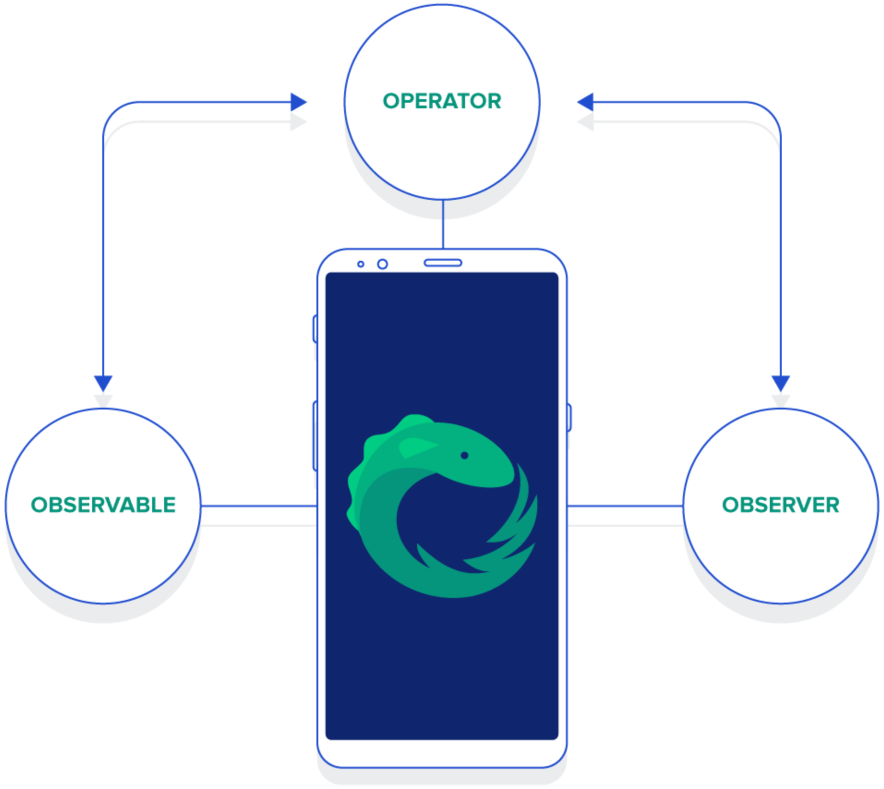
  - Processing user events
    - e.g., mouse movement/clicks, touch events, GPS location signals, etc.



See github.com/ReactiveX/RxAndroid

Overview of Reactive Programming

- Reactive programming is particularly useful to support certain scenarios, e.g.
  - Processing user events
  - Responding to—& processing —latency-bound I/O events

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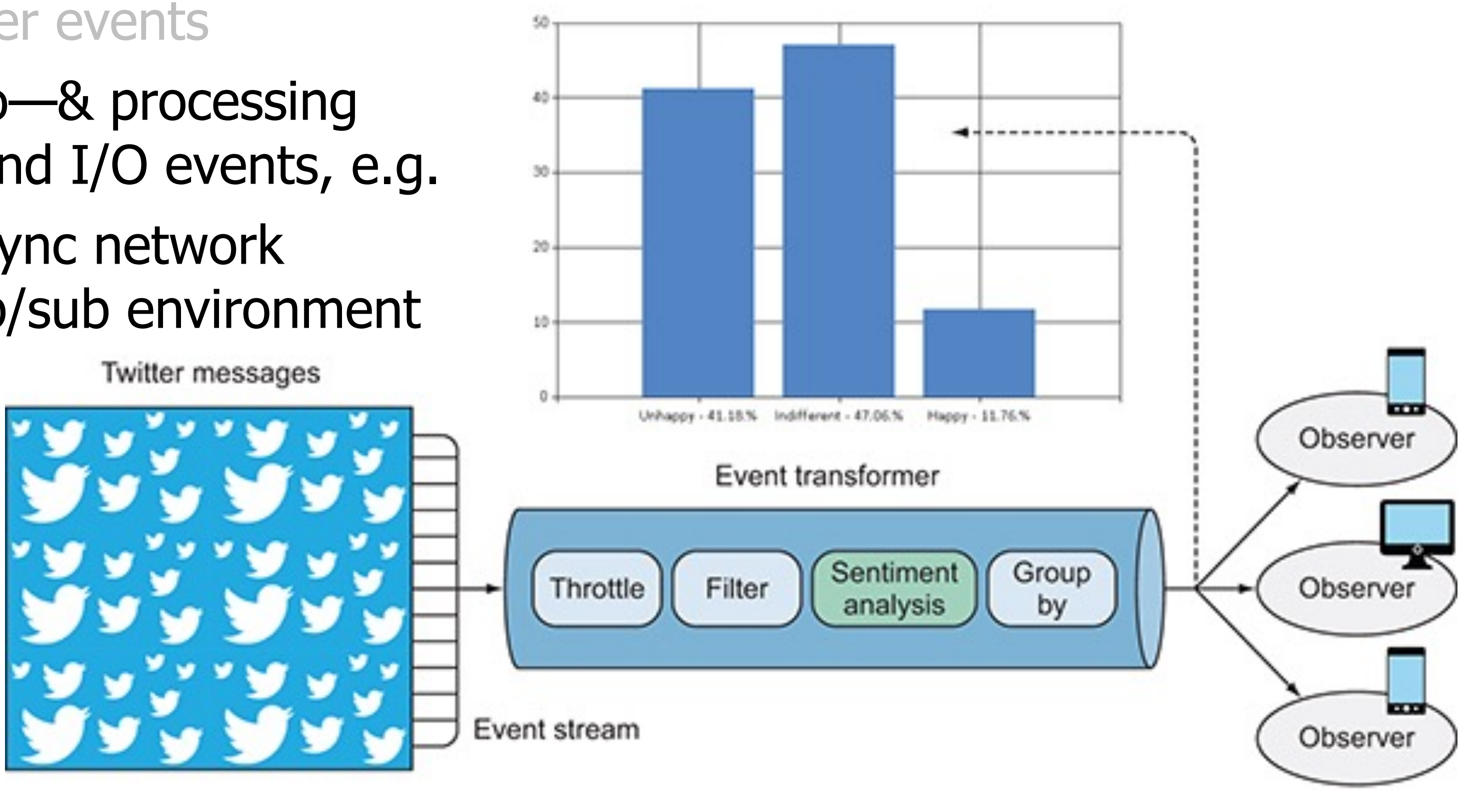
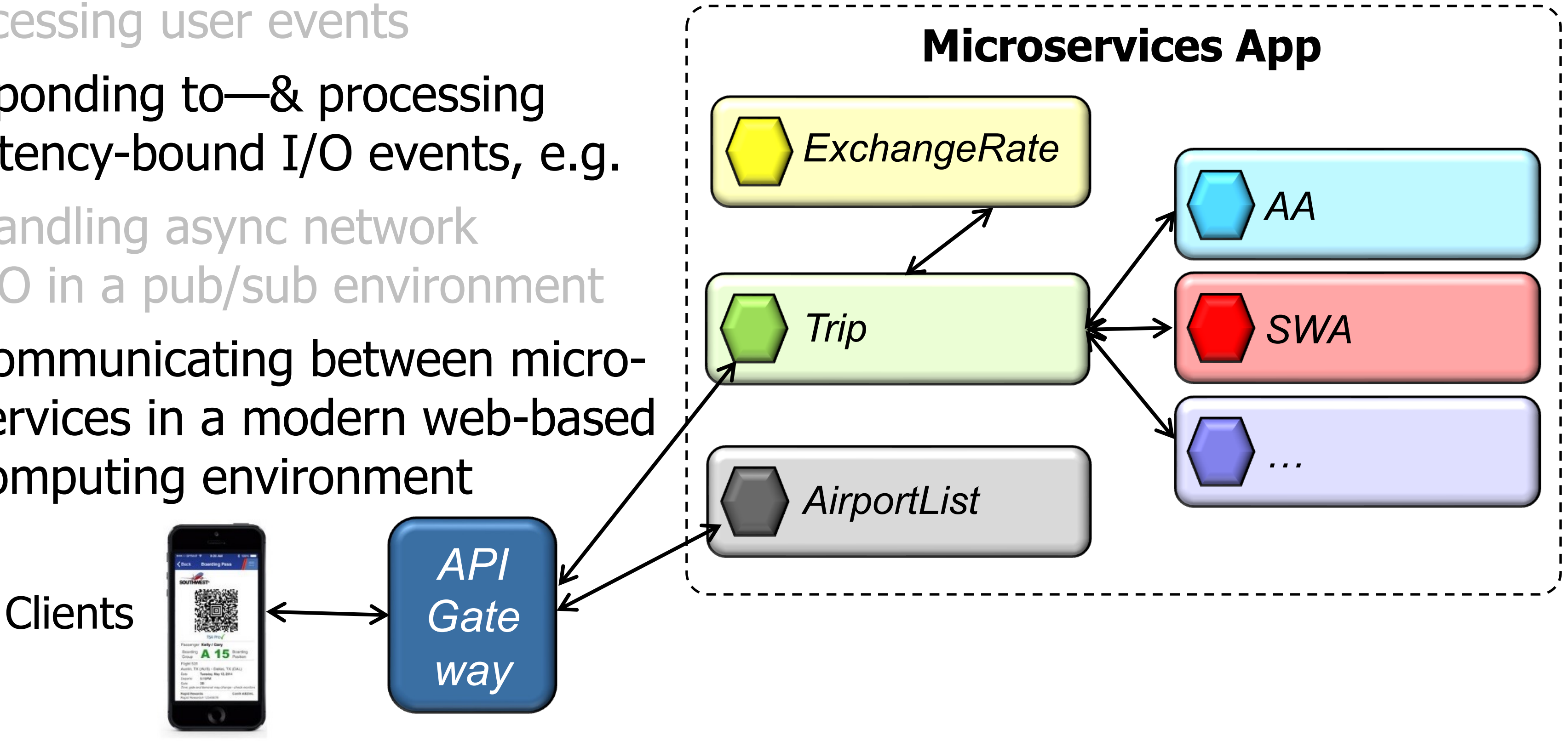
  - Processing user events
  - Responding to—& processing —latency-bound I/O events, e.g.
    - Handling async network I/O in a pub/sub environment



See www.youtube.com/watch?v=z0a0N9OgaAA

Overview of Reactive Programming

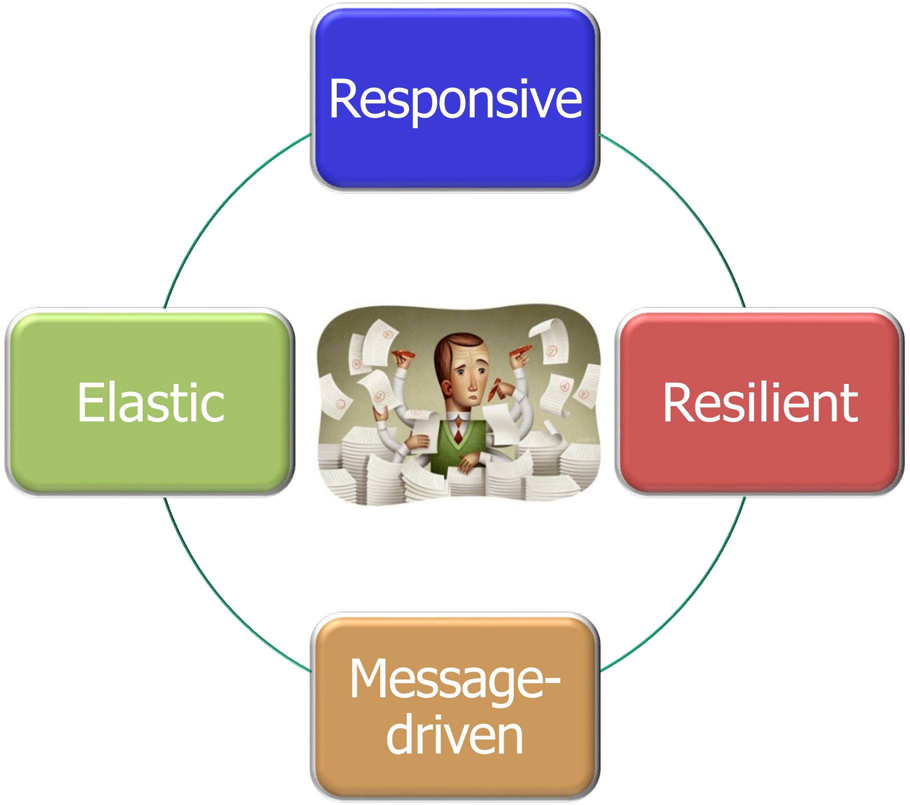
- Reactive programming is particularly useful to support certain scenarios, e.g.
  - Processing user events
  - Responding to—& processing—latency-bound I/O events, e.g.
    - Handling async network I/O in a pub/sub environment
    - Communicating between micro-services in a modern web-based computing environment



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

Overview of Reactive Programming

- Reactive programming is based on four key principles



See www.reactivemanifesto.org

Overview of Reactive Programming

- Reactive programming is based on four key principles, e.g.
  - **Responsive**
    - Provide rapid & consistent response times

Establish reliable upper bounds to deliver consistent quality of service & prevent delays

See en.wikipedia.org/wiki/Responsiveness

Overview of Reactive Programming

- Reactive programming is based on four key principles, e.g.
  - Responsive
  - **Resilient**
    - The system remains responsive, even in the face of failure

Failure of some operations should not bring the entire system down

See en.wikipedia.org/wiki/Resilience_(network)

Overview of Reactive Programming

- Reactive programming is based on four key principles, e.g.
  - Responsive
  - Resilient
  - **Elastic**
    - A system should remain responsive, even under varying workload

Performance should "auto-scale" on multiple cores and/or computers

See en.wikipedia.org/wiki/Autoscaling

Overview of Reactive Programming

- Reactive programming is based on four key principles, e.g.
  - Responsive
  - Resilient
  - Elastic
  - **Message-driven**
    - Asynchronous message-passing ensures loose coupling, isolation, & location transparency between components

This principle is an "implementation detail" wrt the others..

See en.wikipedia.org/wiki/Message-oriented_middleware

Overview of Reactive Programming

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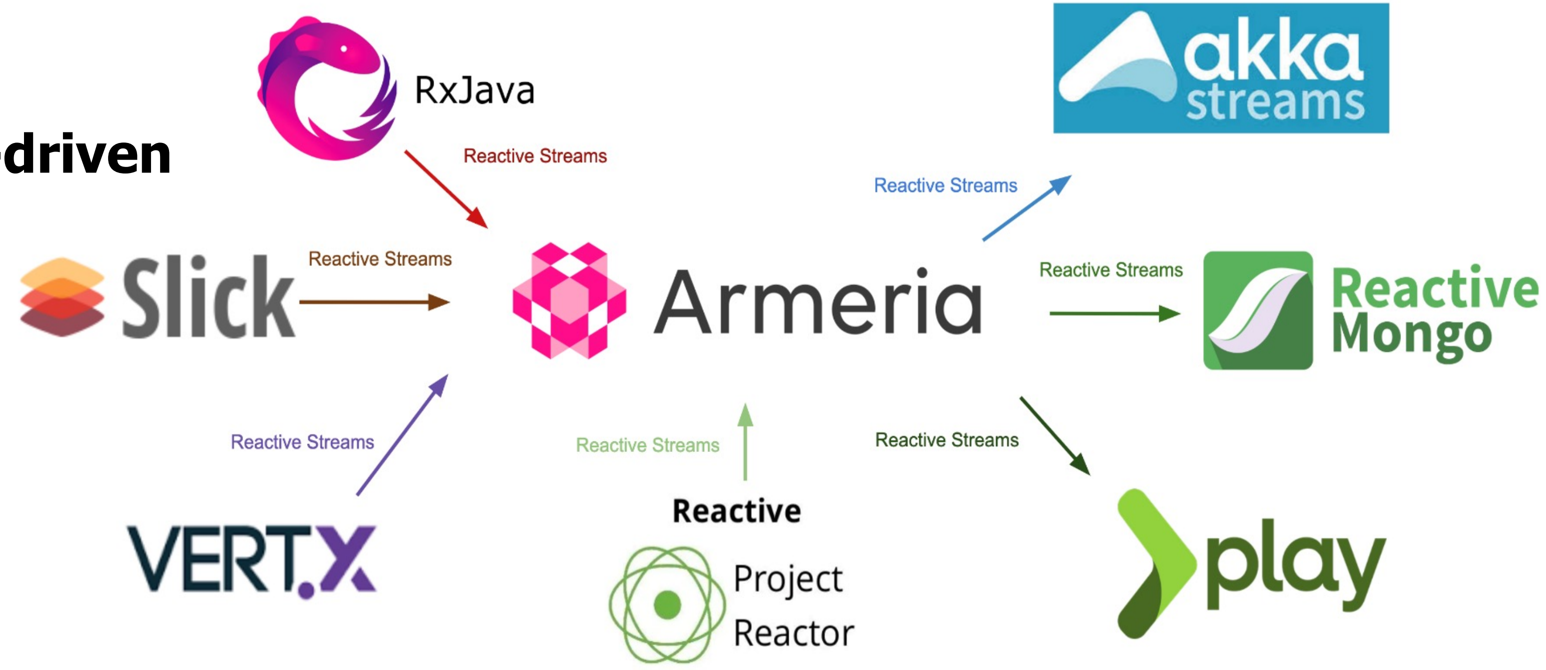
  - **Responsive**
  - **Resilient**
  - **Elastic**
  - **Message-driven**



Reactive streams frameworks intentionally implement reactive programming principles

End of Overview of Reactive Programming Principles