

Reactive Applications on Apache Tomcat

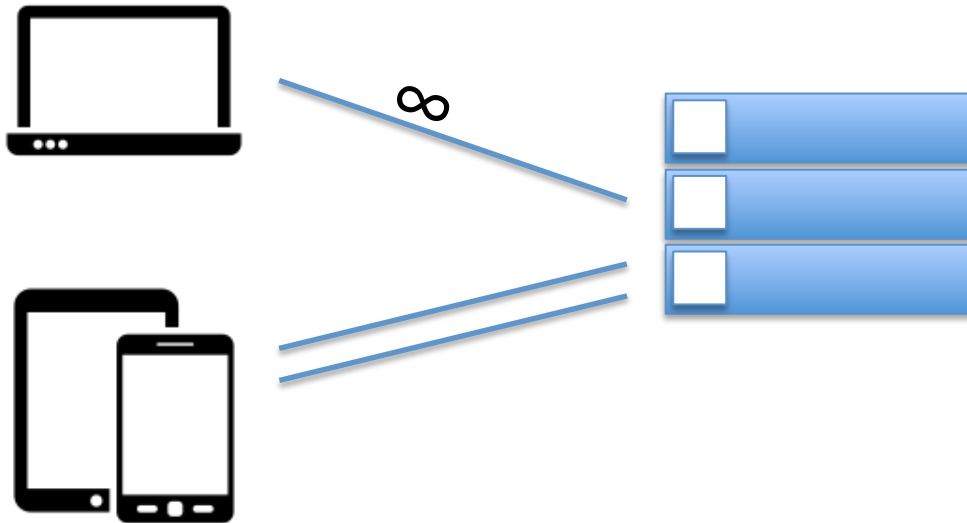
Violeta Georgieva

@violeta_g_g

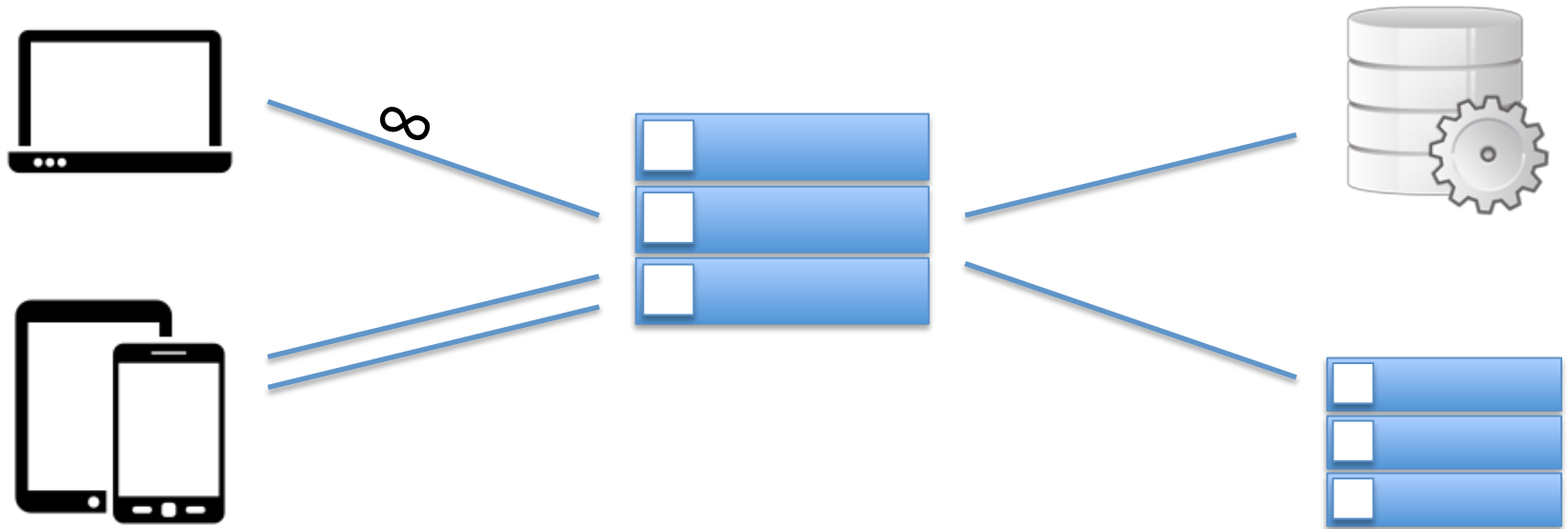
Violeta Georgieva

- Pivotal
- Tomcat committer and PMC
 - RM Tomcat 7.0/8.0
- Spring Framework contributor

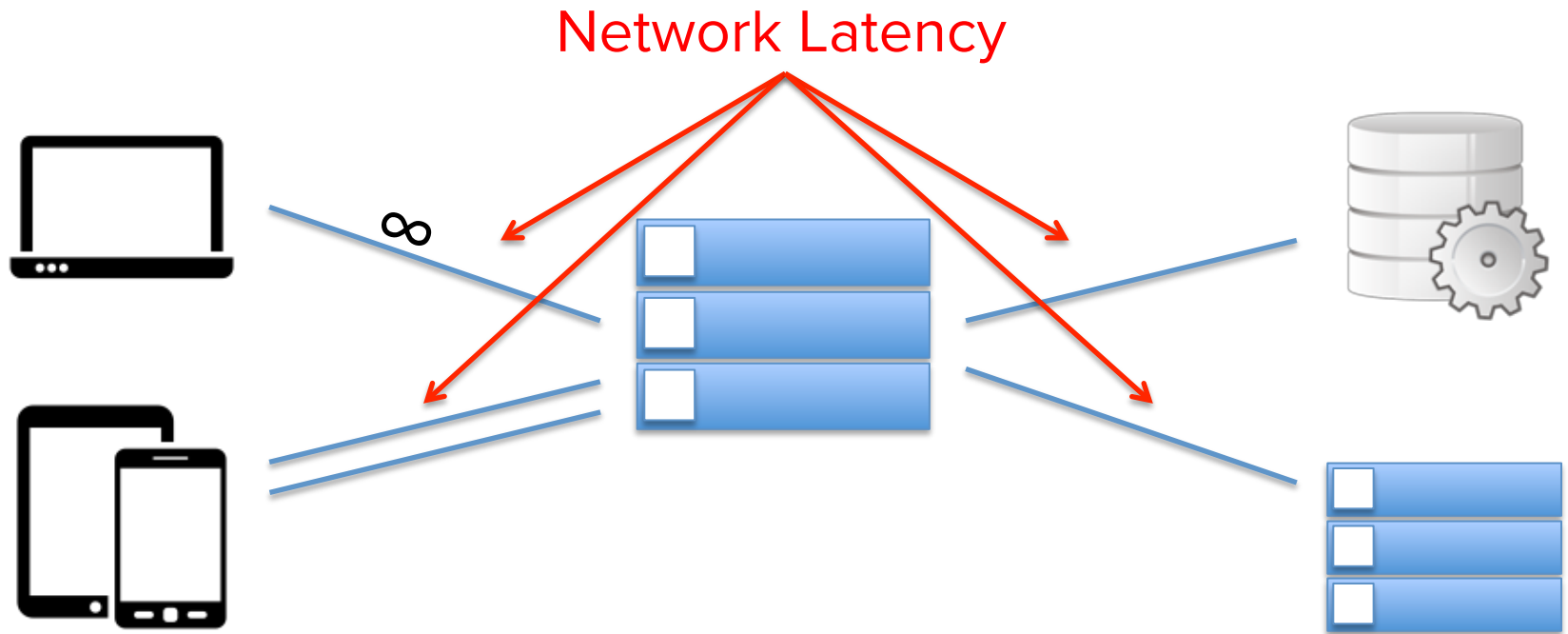
Use Cases



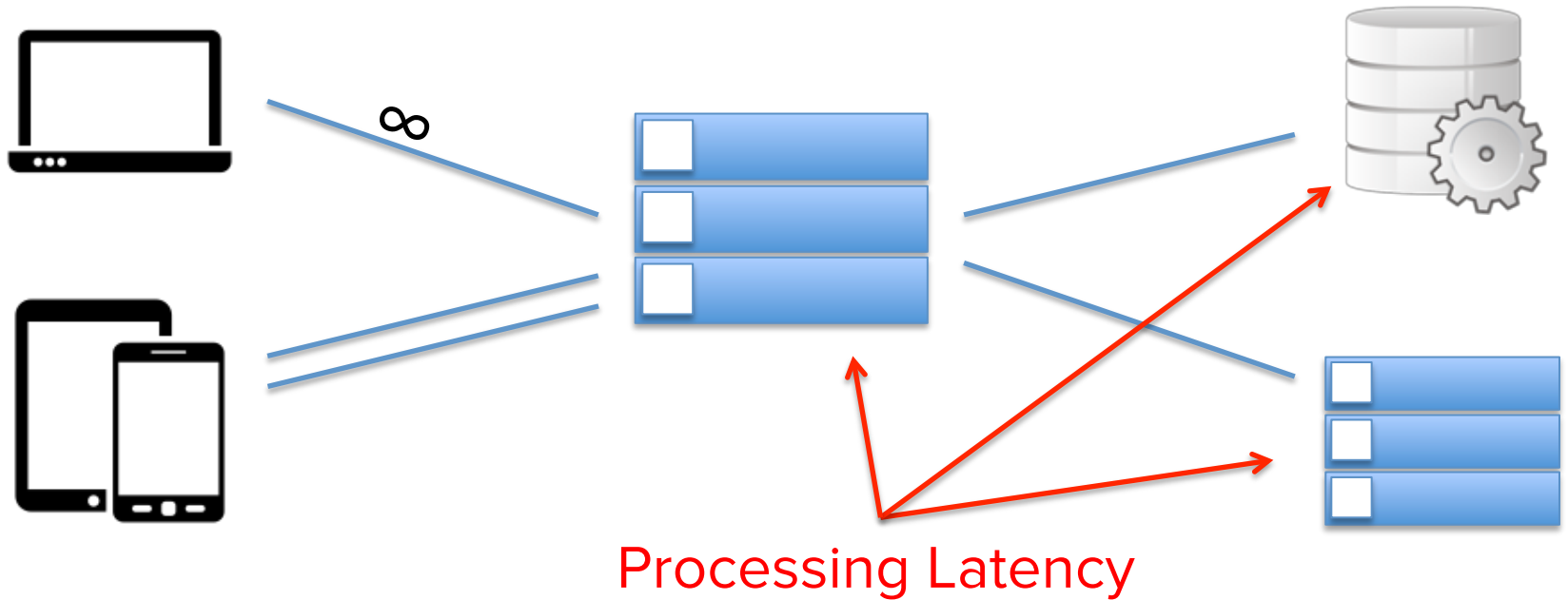
Use Cases



Use Cases

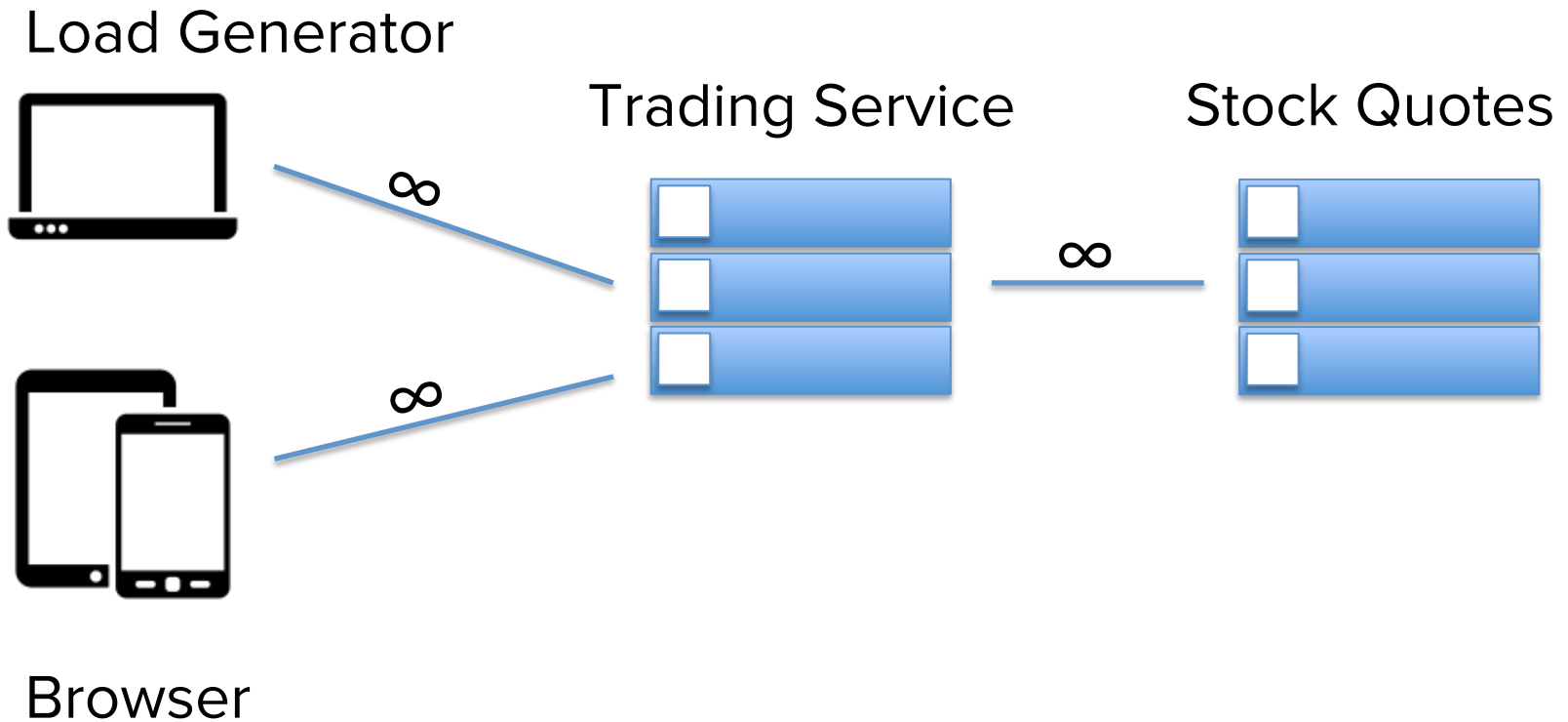


Use Cases



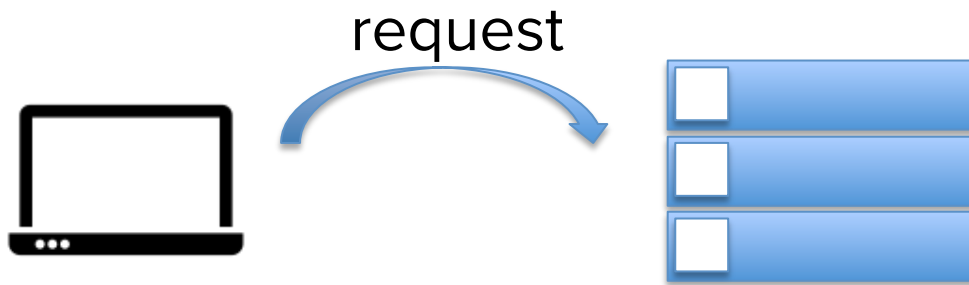
Demo

Blocking



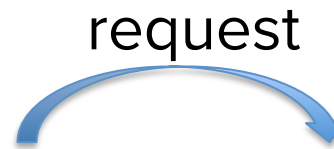
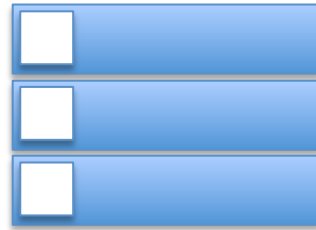
Synchronous Processing

Blocking



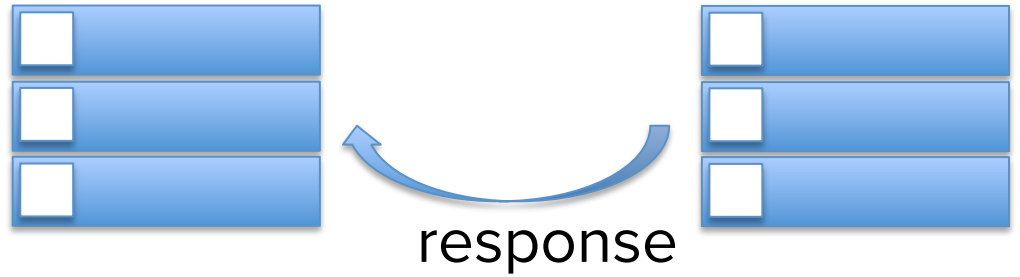
Synchronous Processing

Blocking



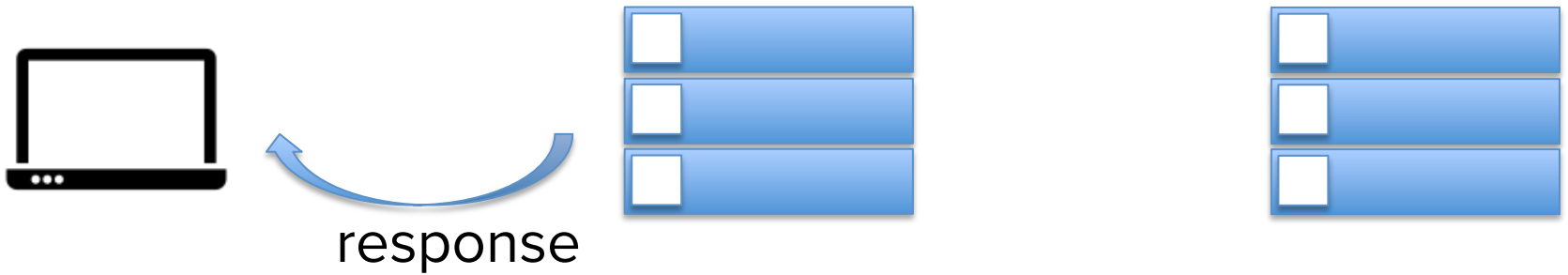
Synchronous Processing

Blocking



Synchronous Processing

Blocking



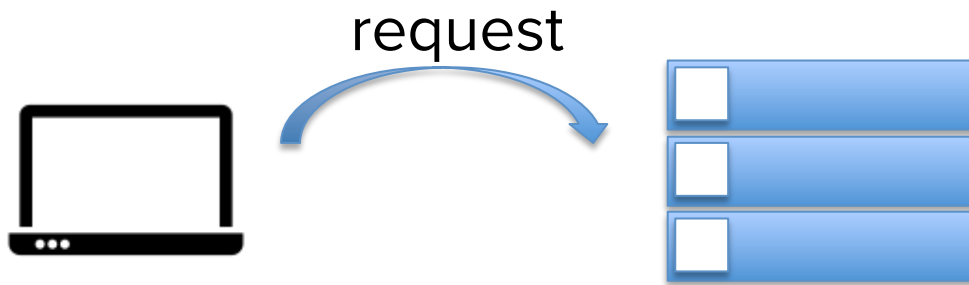
Synchronous Processing

Blocking



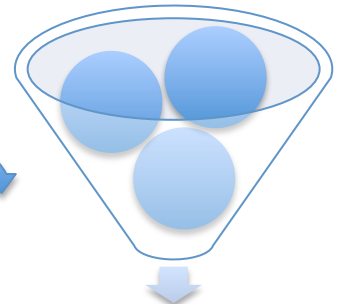
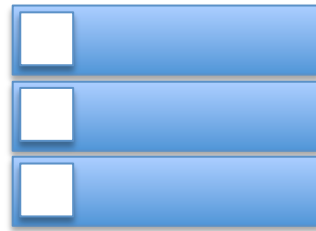
Asynchronous Processing

Blocking



Asynchronous Processing

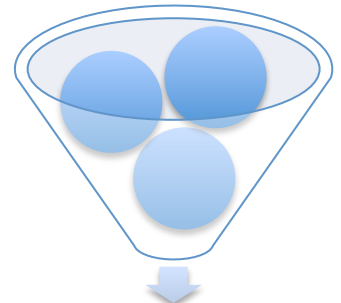
Blocking



Thread Pool

Asynchronous Processing

Blocking



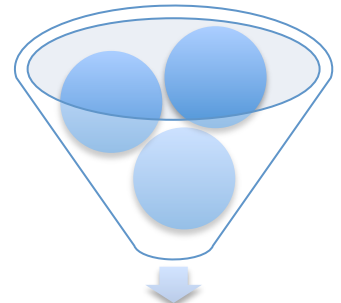
Thread Pool

request



Asynchronous Processing

Blocking



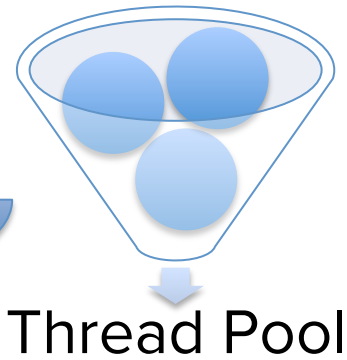
Thread Pool

response



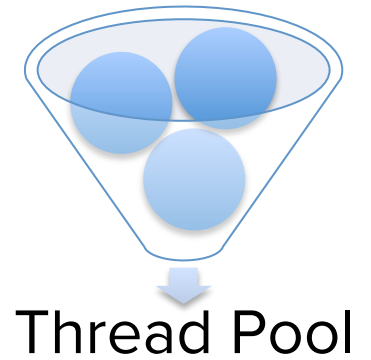
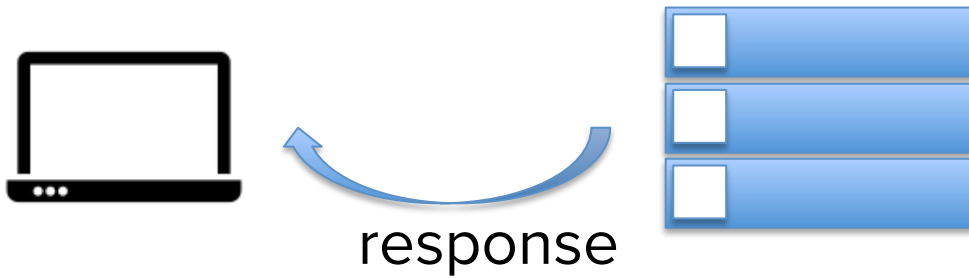
Asynchronous Processing

Blocking



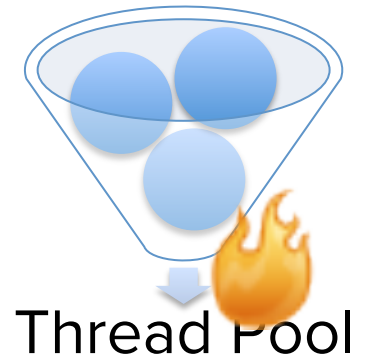
Asynchronous Processing

Blocking



Asynchronous Processing

Blocking



Asynchronous Processing

Non-Blocking Read

```
public interface ReadListener extends EventListener {  
  
    void onDataAvailable() throws IOException;  
  
    void onAllDataRead() throws IOException;  
  
    void onError(Throwable throwable);  
  
}
```

```
public abstract class ServletInputStream extends InputStream {  
  
    public abstract boolean isReady();  
  
    public abstract void setReadListener(ReadListener listener);  
  
    ...  
  
}
```

Asynchronous Processing

Non-Blocking Read

Container



setReadListener



Application



Asynchronous Processing

Non-Blocking Read

Container



Application



onDataAvailable

Asynchronous Processing

Non-Blocking Read

Container



read



Application



Asynchronous Processing

Non-Blocking Read

Container



isReady



Application



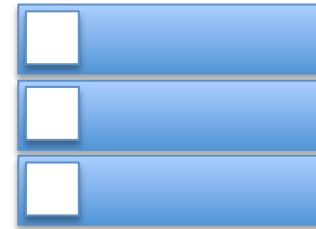
Asynchronous Processing

Non-Blocking Read

Container



Application



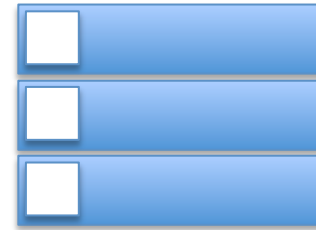
Asynchronous Processing

Non-Blocking Read

Container



Application



Asynchronous Processing

Non-Blocking Write

```
public interface WriteListener extends EventListener{  
    void onWritePossible() throws IOException;  
    void onError(Throwable throwable);  
}
```

```
public abstract class ServletOutputStream extends OutputStream {  
    public abstract boolean isReady();  
    public abstract void setWriteListener(WriteListener listener);  
    ...  
}
```

Asynchronous Processing

Non-Blocking Write

Container



setWriteListener



Application



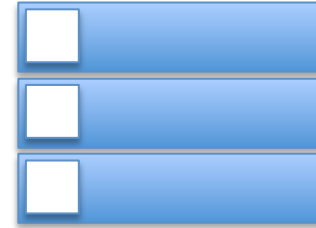
Asynchronous Processing

Non-Blocking Write

Container



Application



onWritePossible

Asynchronous Processing

Non-Blocking Write

Container



write



Application



Asynchronous Processing

Non-Blocking Write

Container



isReady



Application



Asynchronous Processing

Non-Blocking Write

Container



Application



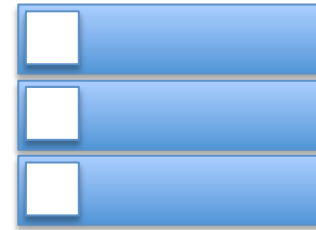
Asynchronous Processing

Non-Blocking Write

Container



Application



Reactive Streams

```
public interface Publisher<T> {  
    void subscribe(Subscriber<? super T> s);  
}
```

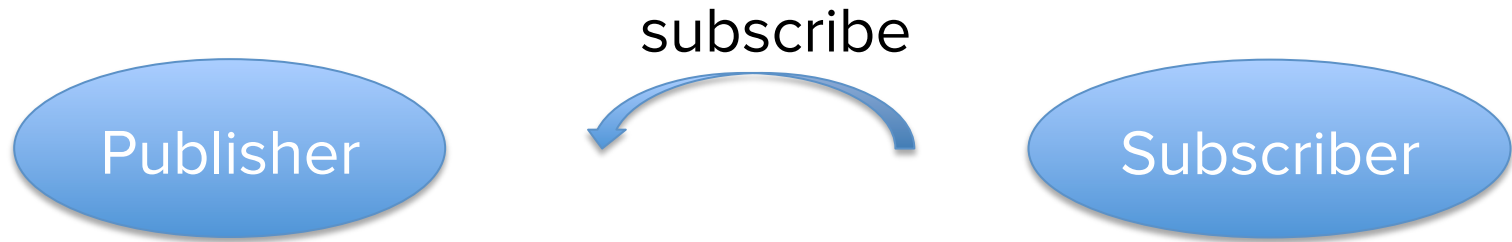
```
public interface Subscriber<T> {  
    void onSubscribe(Subscription s);  
    void onNext(T t);  
    void onError(Throwable t);  
    void onComplete();  
}
```

Reactive Streams

```
public interface Subscription {  
    void request(long n);  
    void cancel();  
}
```

```
public interface Processor<T, R> extends Subscriber<T>, Publisher<R>  
}
```

Reactive Streams



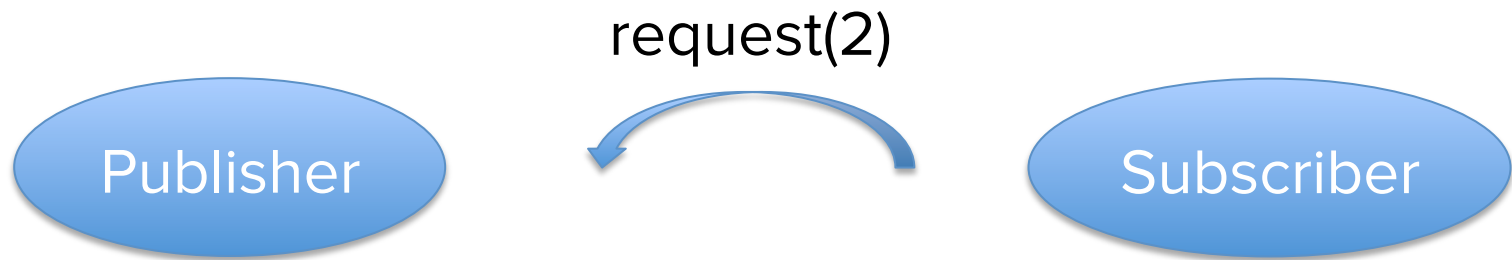
Reactive Streams



onSubscribe



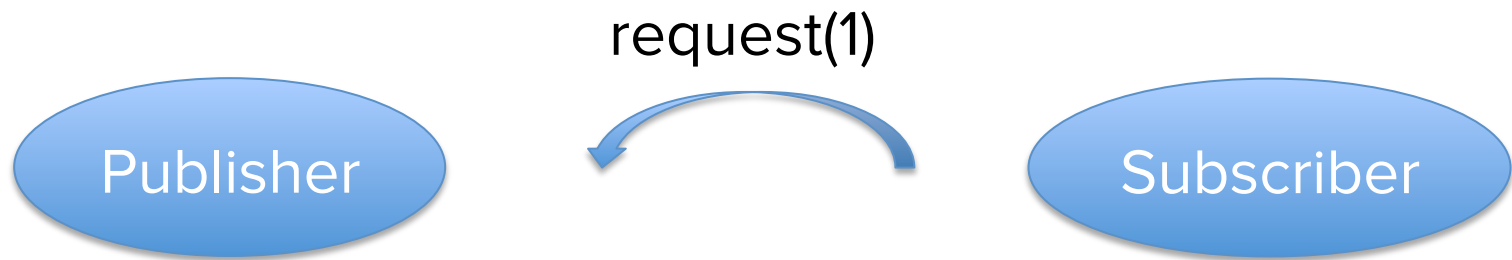
Reactive Streams



Reactive Streams



Reactive Streams



Reactive Streams

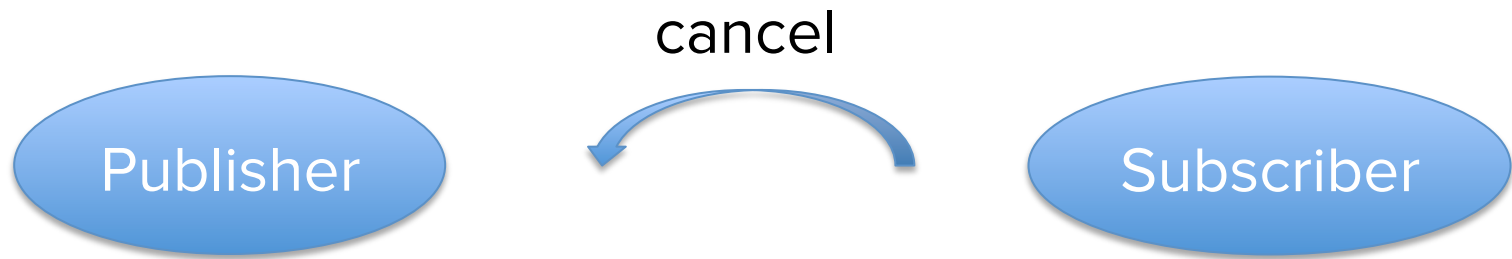


Reactive Streams



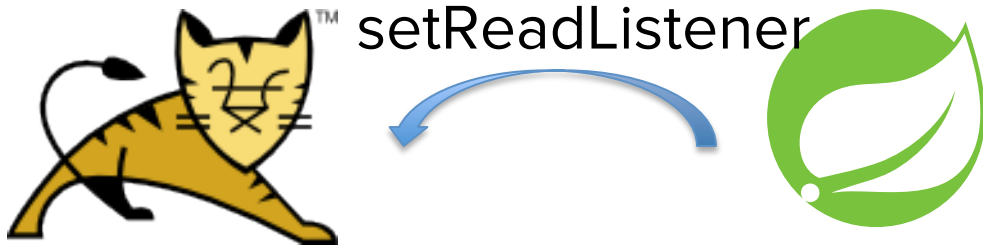
onComplete | onError

Reactive Streams



Servlet 3.1/Reactive Streams Bridge

Read



Servlet 3.1/Reactive Streams Bridge

Read



subscribe



Servlet 3.1/Reactive Streams Bridge

Read



onSubscribe



Servlet 3.1/Reactive Streams Bridge

Read



request



Servlet 3.1/Reactive Streams Bridge

Read



isReady

A blue curved arrow pointing from the Tomcat logo towards the Reactive Streams logo.

Servlet 3.1/Reactive Streams Bridge

Read



Servlet 3.1/Reactive Streams Bridge

Read



data



Servlet 3.1/Reactive Streams Bridge

Read



onNext



Servlet 3.1/Reactive Streams Bridge

Read



request



Servlet 3.1/Reactive Streams Bridge

Read



isReady

A blue curved arrow pointing from the Tomcat logo towards the Reactive Streams logo.

Servlet 3.1/Reactive Streams Bridge

Read



stop ✘



Servlet 3.1/Reactive Streams Bridge

Read



onDataAvailable



Servlet 3.1/Reactive Streams Bridge

Read



Servlet 3.1/Reactive Streams Bridge

Read



data



Servlet 3.1/Reactive Streams Bridge

Read

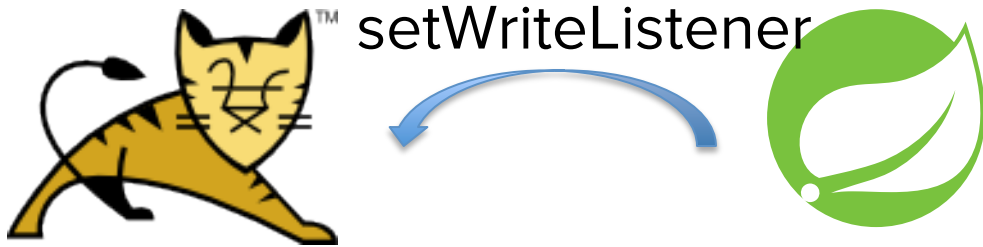


onNext



Servlet 3.1/Reactive Streams Bridge

Write



Servlet 3.1/Reactive Streams Bridge

Write



subscribe



Servlet 3.1/Reactive Streams Bridge

Write



onSubscribe



Servlet 3.1/Reactive Streams Bridge

Write



request



Servlet 3.1/Reactive Streams Bridge

Write



onNext



Servlet 3.1/Reactive Streams Bridge

Write



isReady

A blue curved arrow pointing from the Tomcat logo towards the Reactive Streams logo.

Servlet 3.1/Reactive Streams Bridge

Write



Servlet 3.1/Reactive Streams Bridge

Write



request



Servlet 3.1/Reactive Streams Bridge

Write



onNext



Servlet 3.1/Reactive Streams Bridge

Write



isReady

A blue curved arrow pointing from the Tomcat logo towards the Reactive Streams logo.

Servlet 3.1/Reactive Streams Bridge

Write



stop ✘



Servlet 3.1/Reactive Streams Bridge

Write



onWritePossible

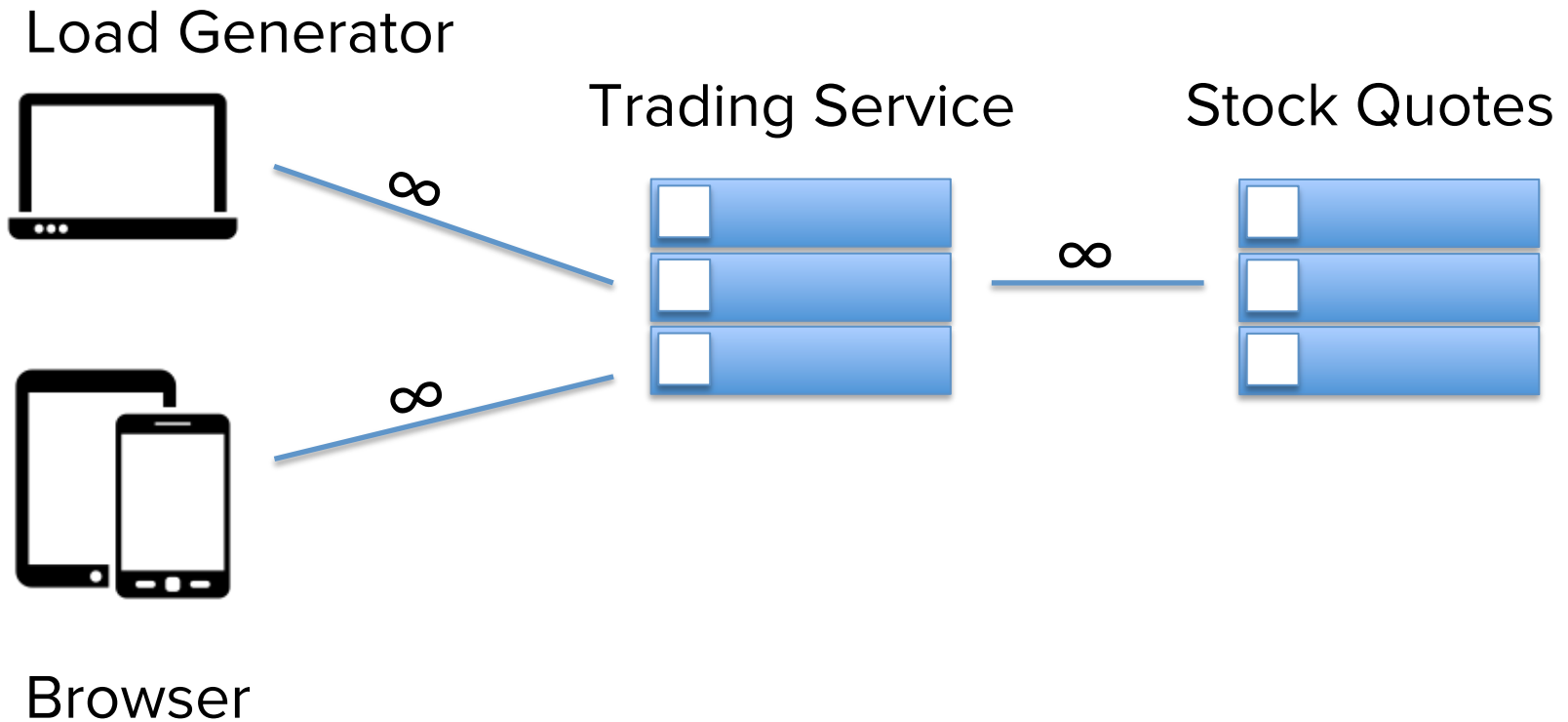
Servlet 3.1/Reactive Streams Bridge

Write



Demo

Non-Blocking



THANK YOU

<https://github.com/violetagg/ApacheEURoadshowDemo>