Apache Camel

Camel in Berlin

by Claus Ibsen

@davsclaus

FuseSource

A Progress Software Company

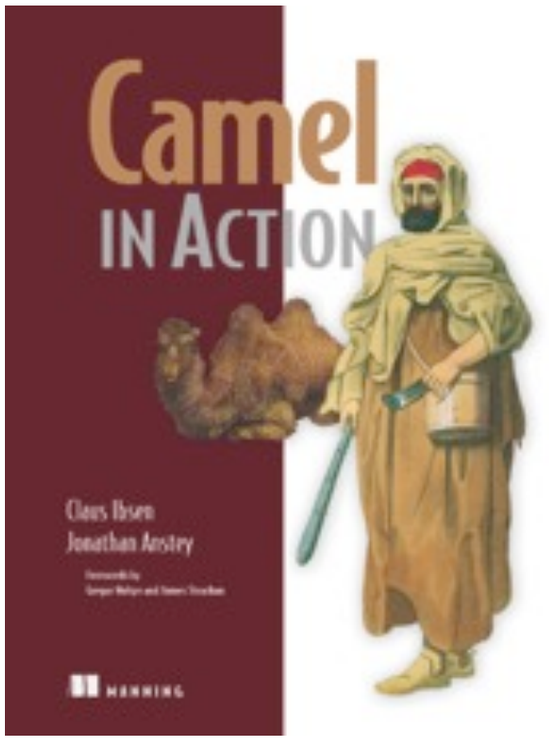
Camel in Berlin

Agenda

- Your speaker
- What is Apache Camel?
- A little example
- Whats included in the box?
- Running Camel
- Live Demos
- Q and A

Who is Claus Ibsen?

- Principal Software Engineer at FuseSource
- Apache Camel
  - 4.5 years working with Camel
- Author of Camel in Action book
- Contact
  - Twitter: @davsclaus
  - Blog: http://davsclaus.blogspot.com
  - Email: cibsen@fusesource.com



http://manning.com/ibsen

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Why the name Camel?

- What does Camel stand for?

Concise
Application
Messaging
Exchange
Language

http://camel.apache.org/why-the-name-camel.html

Why the name Camel?

- The reason for the Camel name

Camel is easy to remember and type

http://camel.apache.org/why-the-name-camel.html

The birth of Camel

- Camel's parents

The birth of Camel

- First commit
  r519901 | jstrachan | 2007-03-19 11:54:57 +0100 (Mon, 19 Mar 2007) | 1 line

  Initial checkin of Camel routing library

- Camel 1.0 released June 2007

The birth of Camel

- My initial commit

  r640963 | davsclaus | 2008-03-25 21:07:10 +0100 (Tue, 25 Mar 2008) | 1 line

  Added unit test for mistyped URI

Agenda

- Your speaker
- **What is Apache Camel?**
- A little example
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What is Apache Camel?

- Quote from the web site
  - http://camel.apache.org

> Camel is a powerful Open Source Integration Framework based on known Enterprise Integration Patterns

What is Apache Camel?

- Why do we need integration?
  - Your apps are build using different tech stacks
  - Critical for your business to integrate
- Why Integration Framework?
  - Framework do the heavy lifting
  - Focus on business problem
  - Not "reinventing the wheel"

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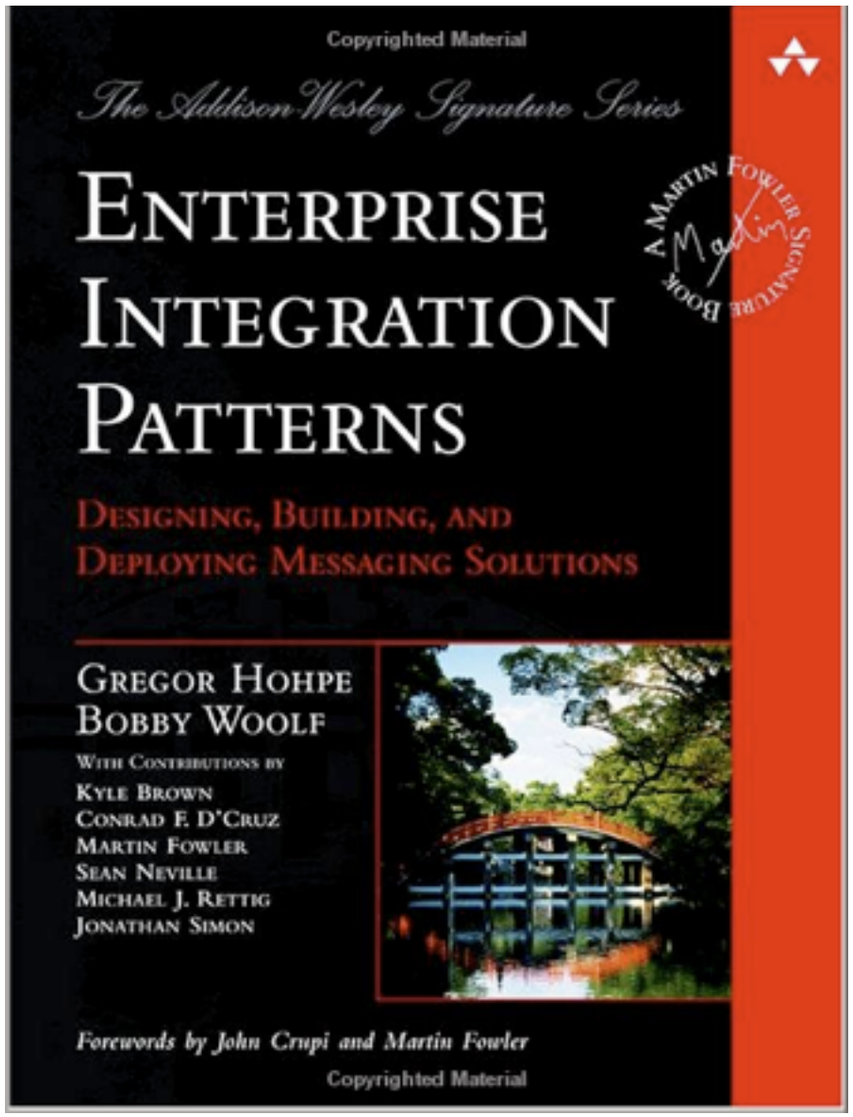
What is Apache Camel?

- What is Enterprise Integration Patterns?

What is Apache Camel?

- What is Enterprise Integration Patterns?



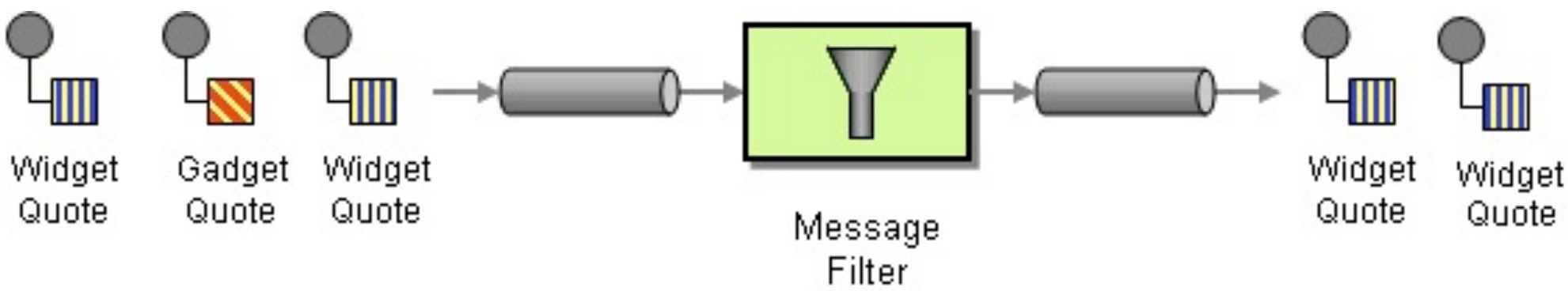
Its a book

What is Apache Camel?

- Camel and EIP

What is Apache Camel?

- Camel and EIP



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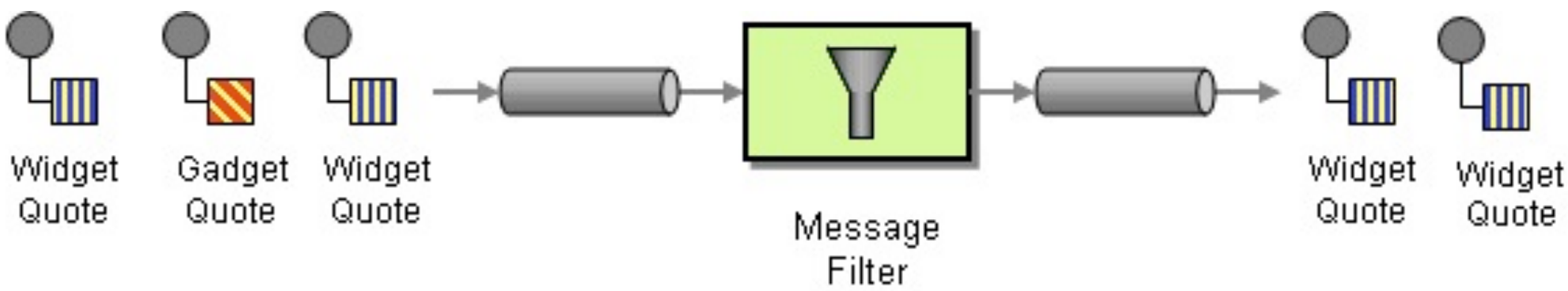
What is Apache Camel?

- Camel and EIP

from A

filter message

send to B



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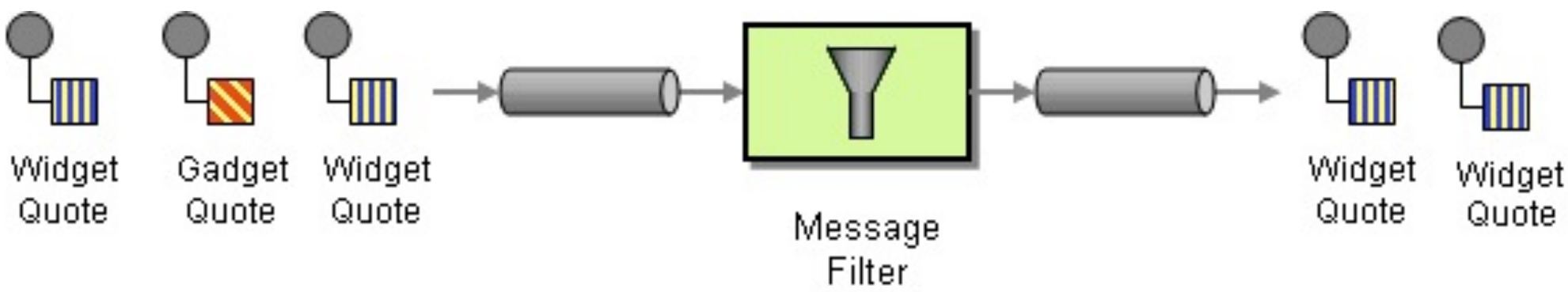
What is Apache Camel?

- Camel and EIP

from(A) filter(predicate) to(B)



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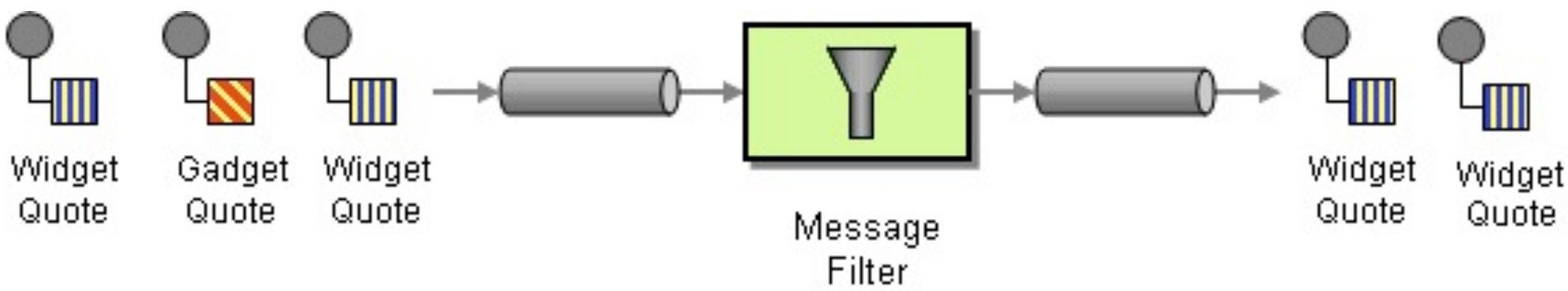
What is Apache Camel?

- Camel and EIP

from(A) .filter(isWidget) .to(B)



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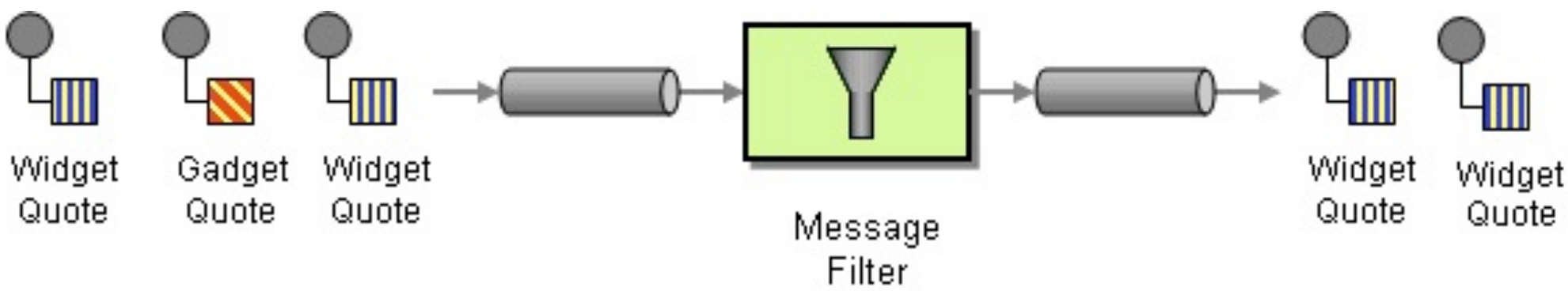
What is Apache Camel?

- Camel and EIP

from(A).filter(isWidget).to(B);



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What is Apache Camel?

- Camel and EIP

```
isWidget = xpath("/quote/product = ‘widget’");

from(A).filter(isWidget).to(B);
```

What is Apache Camel?

- Camel and EIP

```
Endpoint A = endpoint("activemq:queue:quote");
Endpoint B = endpoint("mq:quote");
Predicate isWidget = xpath("/quote/product = ‘widget’");

from(A).filter(isWidget).to(B);
```

What is Apache Camel?

- Filter Route

```
public void configure() throws Exception {
    Endpoint A = endpoint("activemq:queue:quote");
    Endpoint B = endpoint("mq:quote");
    Predicate isWidget = xpath("/quote/product = ‘widget’");

    from(A).filter(isWidget).to(B);
}
```

What is Apache Camel?

- Filter Route - Java DSL

```
import org.apache.camel.builder.RouteBuilder;

public class FilterRoute extends RouteBuilder {
   public void configure() throws Exception {
     Endpoint A = endpoint("activemq:queue:quote");
     Endpoint B = endpoint("mq:quote");
     Predicate isWidget = xpath("/quote/product = ‘widget’");

     from(A).filter(isWidget).to(B);
   }
}
```

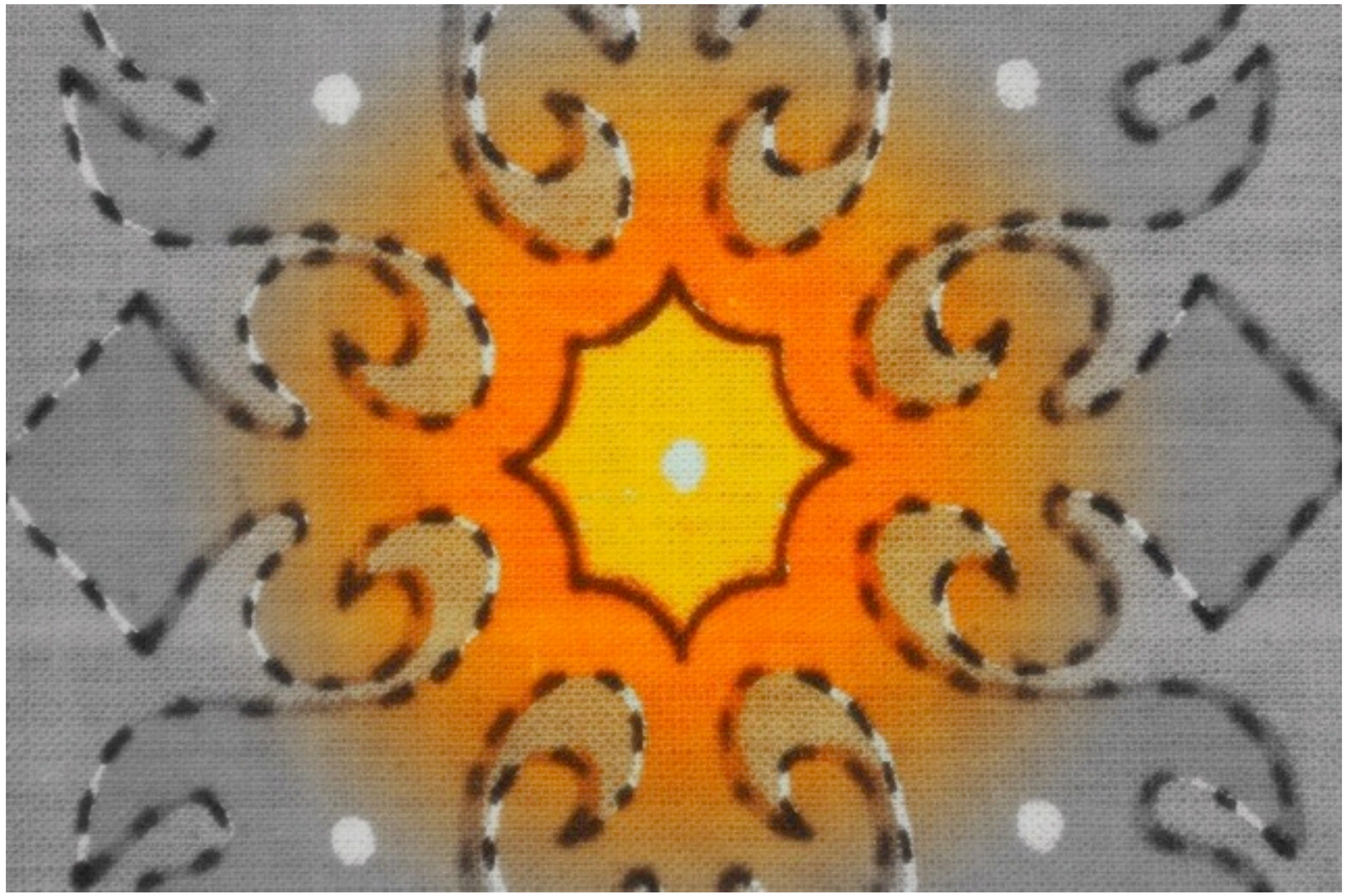
What is Apache Camel?

- Filter Route - Java DSL

```
import org.apache.camel.builder.RouteBuilder;

public class FilterRoute extends RouteBuilder {

   public void configure() throws Exception {
      from("activemq:queue:quote")
        .filter().xpath("/quote/product ='widget'")
          .to("mq:quote");
   }
}
```

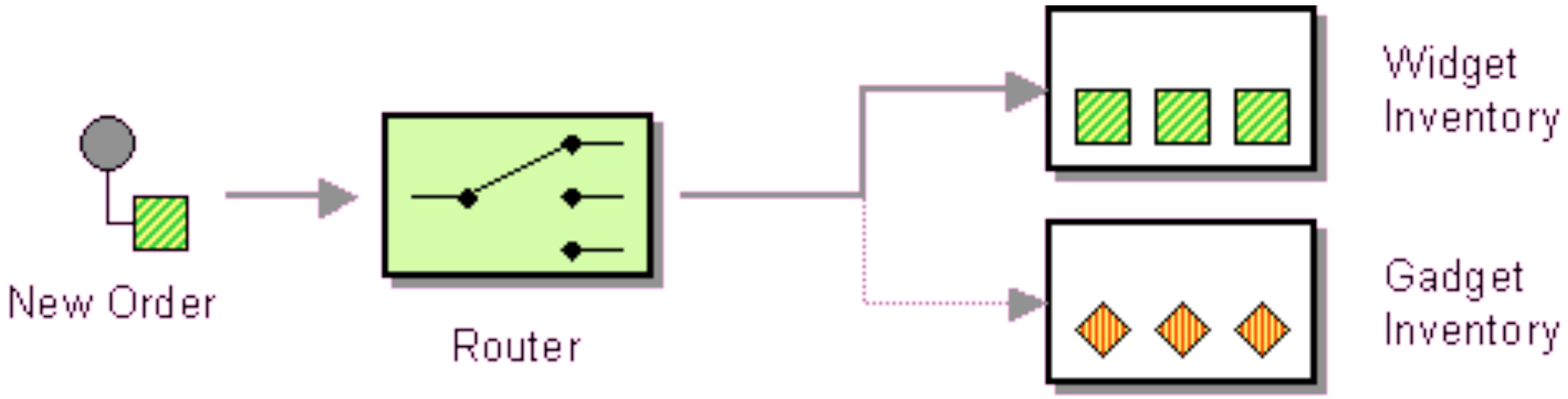
What is Apache Camel?

- Lets look at the most famous pattern



What is Apache Camel?

- Content Based Router



What is Apache Camel?

- Content Based Router - XML DSL

```
<camelContext>
  <route>
    <from uri="activemq:NewOrders"/>
    <choice>
      <when>
        <xpath>/order/product = 'widget'</xpath>
        <to uri="activemq:Orders.Widgets"/>
      </when>
      <otherwise>
        <to uri="activemq:Orders.Gadgets"/>
      </otherwise>
    </choice>
  </route>
</camelContext>
```

What is Apache Camel?

- Content Based Router - Java DSL

```
from("activemq:NewOrders")
  .choice()
    .when().xpath("/order/product = 'widget'")
    .to("activemq:Orders.Widget")
  .otherwise()
    .to("activemq:Orders.Gadget");
```

What is Apache Camel?

- Endpoints as URIs

use file instead

```
from("file:inbox/orders")
  .choice()
    .when().xpath("/order/product = 'widget'")
    .to("activemq:Orders.Widget")
  .otherwise()
    .to("activemq:Orders.Gadget");
```

What is Apache Camel?

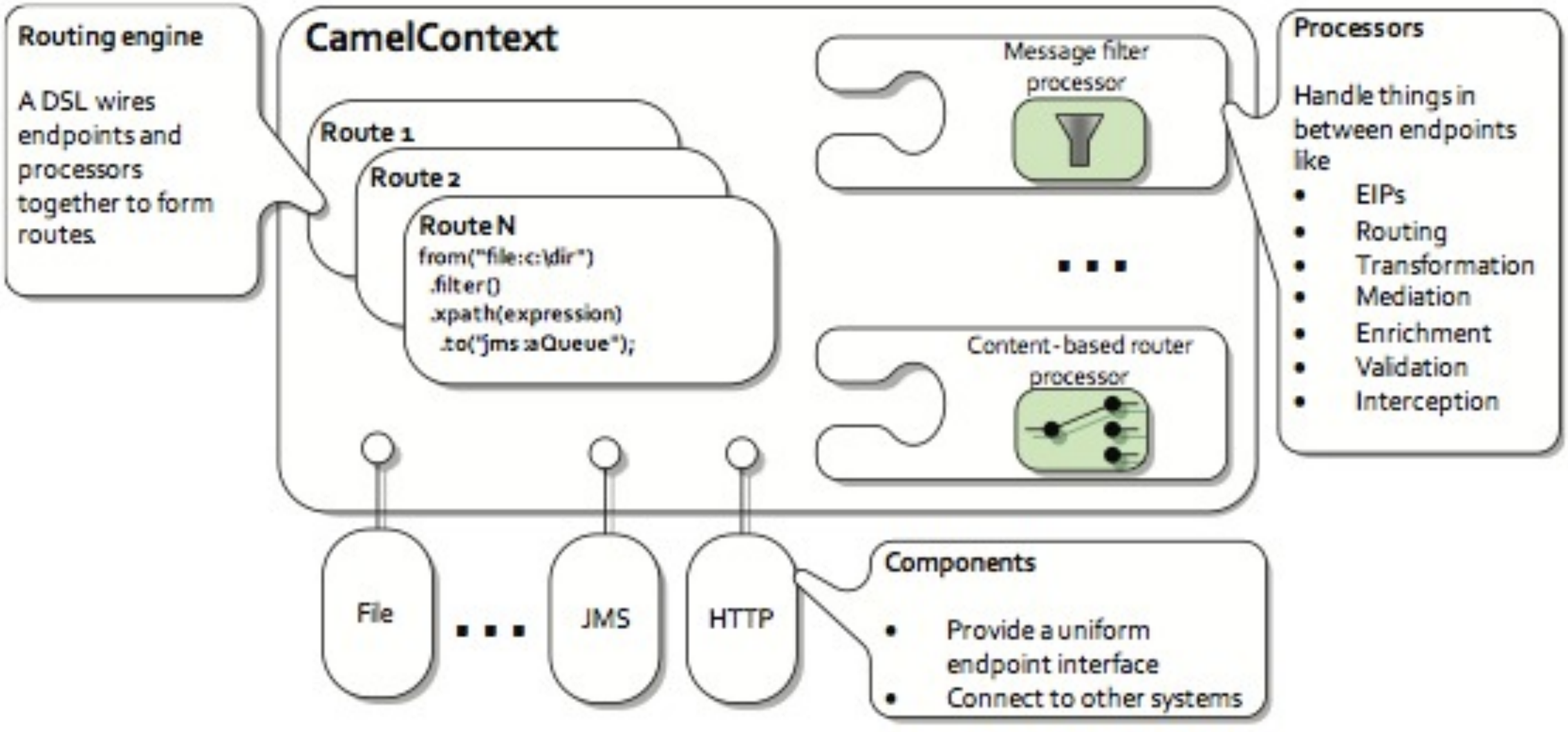
- Endpoints as URIs

parameters

```
from("file:inbox/orders?delete=true")
  .choice()
    .when().xpath("/order/product = 'widget'")
    .to("activemq:Orders.Widget")
  .otherwise()
    .to("activemq:Orders.Gadget");
```

What is Apache Camel?

- Camel Architecture



What is Apache Camel?

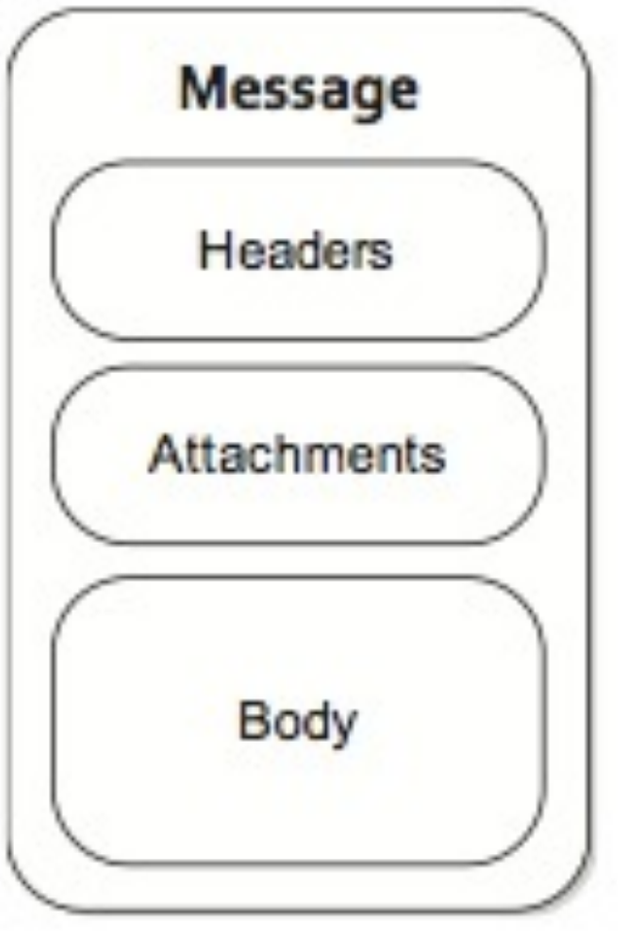
- Summary
  - Integration framework
  - Enterprise Integration Patterns (EIP)
  - Routing (using DSL)
  - Easy configuration (endpoints as URIs)
  - No heavy specification
  - No container dependency
  - Payload agnostic
  - A lot of components

Agenda

- Your speaker
- What is Apache Camel?
- **A little example**
- Whats included in the box?
- Running Camel
- Live Demos
- Q and A

A little example

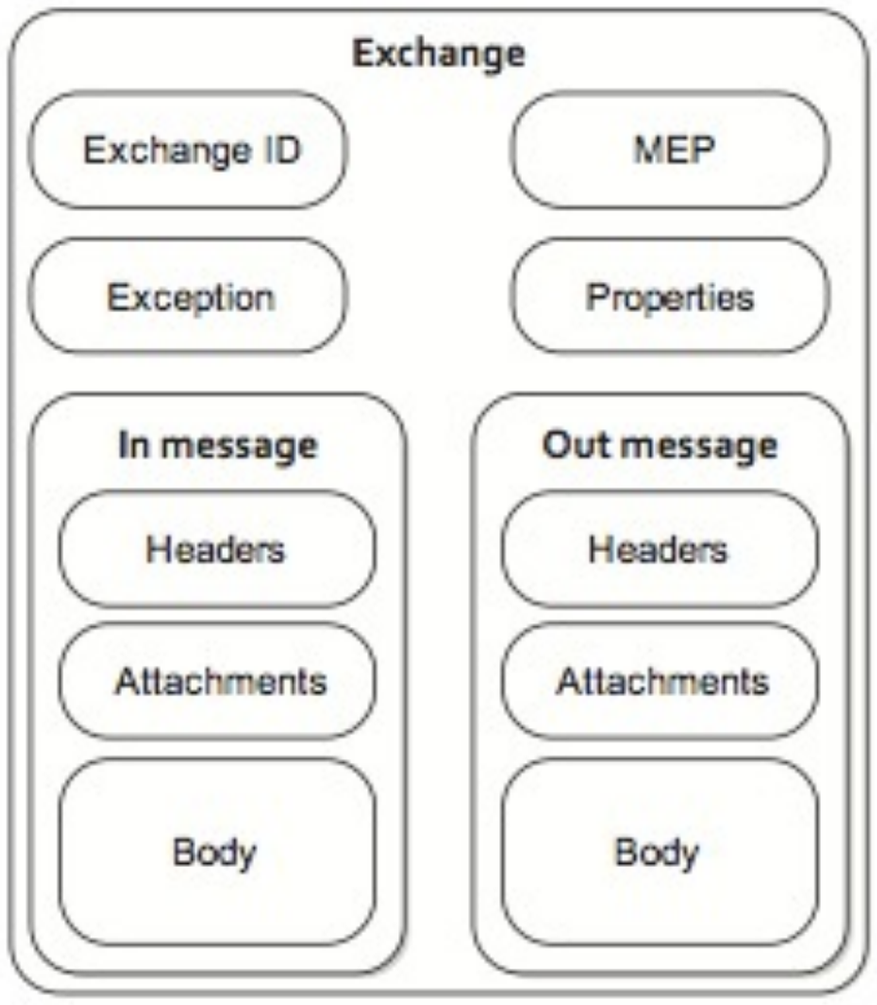
- What is a Message?



org.apache.camel.Message

A little example

- ... And Message is contained in an Exchange



org.apache.camel.Exchange

A little example

- File Copier Example

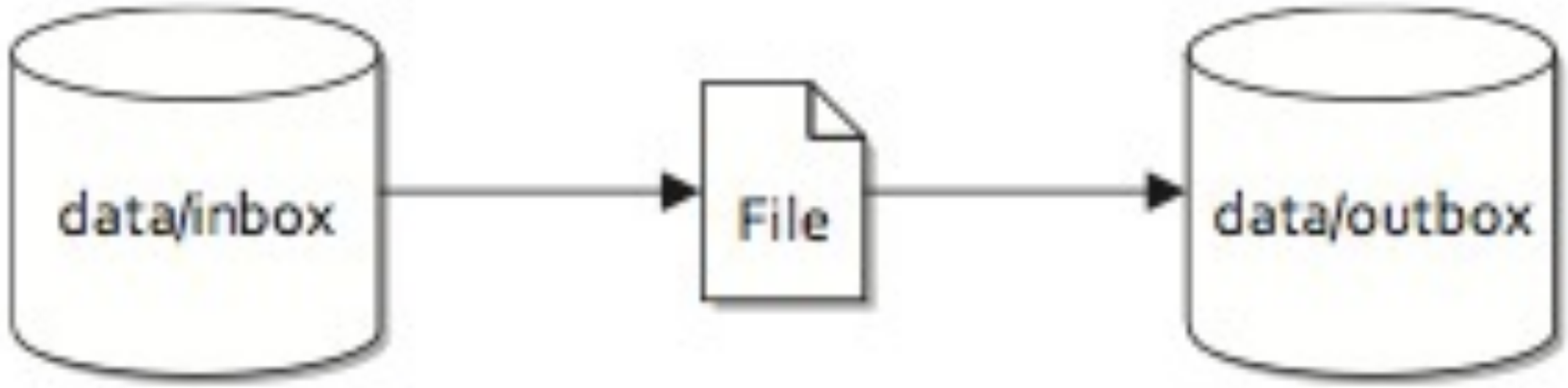


Figure 1.2 Files are routed from the data/inbox directory to the data/outbox directory.

A little example

- File Copier Example

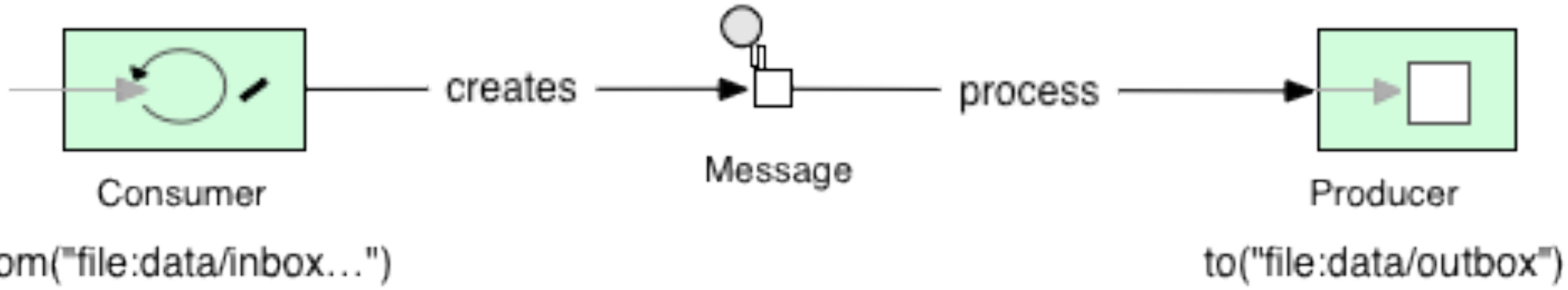
Listing 1.2 Routing files from one folder to another with Apache Camel

```
public class FileCopierWithCamel {
    public static void main(String args[]) throws Exception {
        CamelContext context = new DefaultCamelContext();
        context.addRoutes(new RouteBuilder() {
            public void configure() {
                from("file:data/inbox?noop=true")
                    .to("file:data/outbox");
            }
        });
        context.start();
        Thread.sleep(10000);
        context.stop();
    }
}
```

1 **Routes files from inbox to outbox**

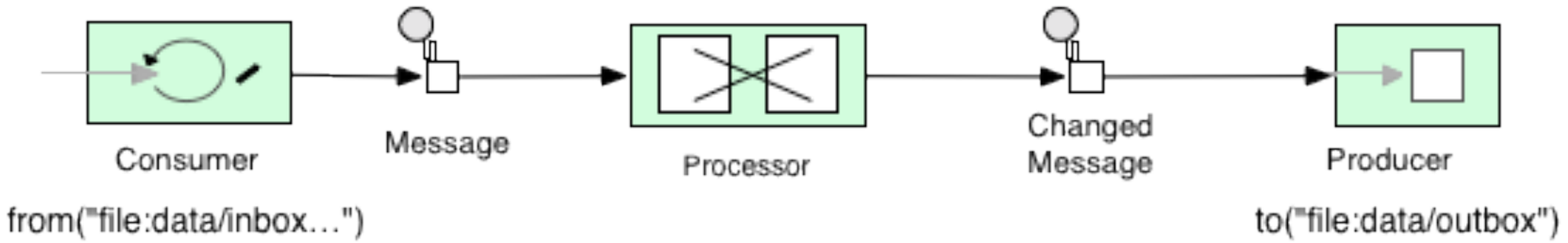
A little example

- File Copier Example



A little example

- File Copier w/ Transformation Example

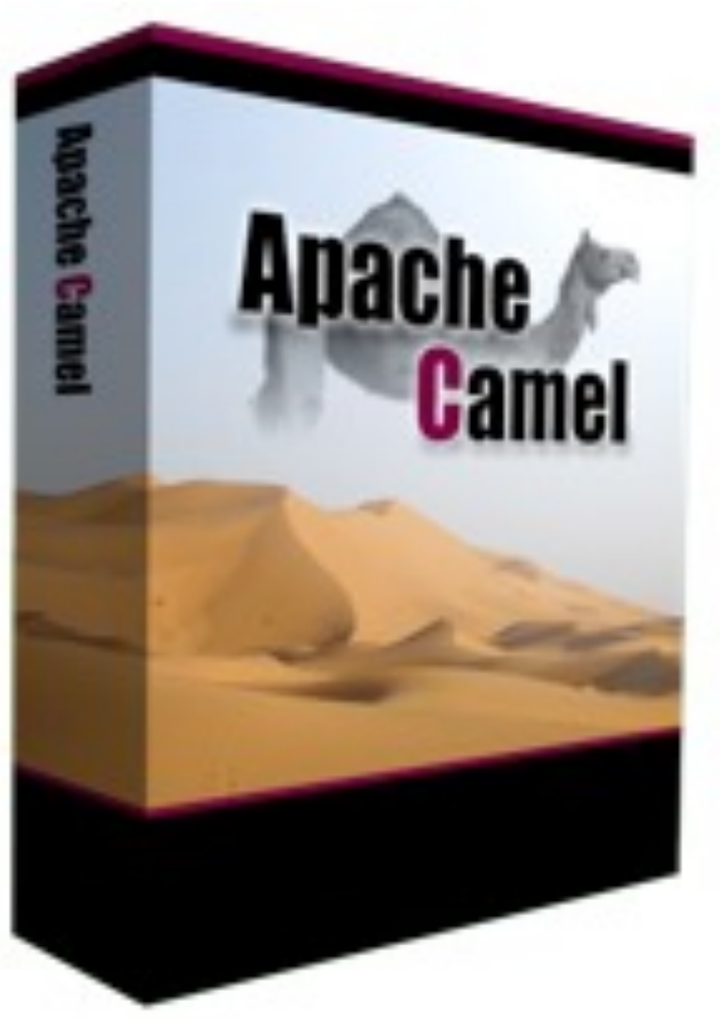


Agenda

- Your speaker
- What is Apache Camel?
- A little example
- **Whats included in the box?**
- Running Camel
- Live Demos
- Q and A

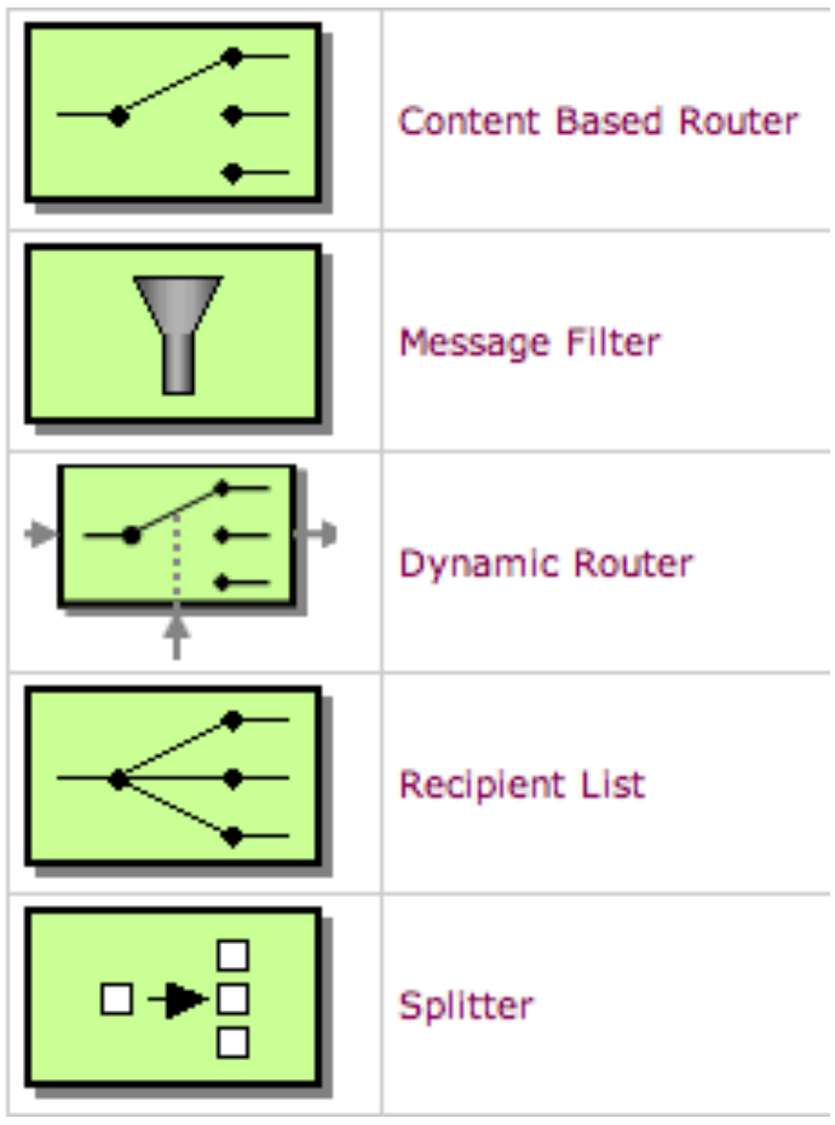
Whats included in the box?

- Highlights of some of the features
  (there is much more)



Whats included in the box?

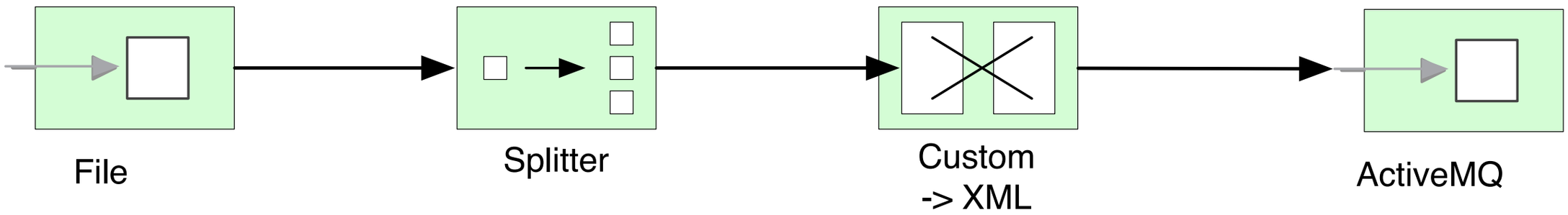
- 50 Enterprise Integration Patterns



http://camel.apache.org/eip

Whats included in the box?

- Splitter EIP




```
from("file:inbox")
   .split(body().tokenize("\n")
      .marshal(customToXml)
      .to("activemq:line");
```

Whats included in the box?

- 100 Components

activemq	cxf	flatpack	jasypt
activemq-journal	cxfrs	freemarker	javaspace
amqp	dataset	ftp/ftps/sftp	jbi
atom	db4o	gae	jcr
bean	direct	hdfs	jdbc
bean validation	ejb	hibernate	jetty
browse	esper	hl7	jms
cache	event	http	jmx
cometd	exec	ibatis	jpa
crypto	file	irc	jt/400

http://camel.apache.org/components.html

Whats included in the box?

- 100 Components

language	properties	seda	stream
ldap	quartz	servlet	string-template
mail/imap/pop3	quickfix	sip	test
mina	ref	smooks	timer
mock	restlet	smpp	validation
msv	rmi	snmp	velocity
nagios	rnc	spring-integration	vm
netty	rng	spring-security	xmpp
nmr	rss	spring-ws	xquery
printer	scalate	sql	xslt

http://camel.apache.org/components.html

Whats included in the box?

- 22 Data Formats

bindy	json
beanio	protobuf
castor	rss
csv	serialization
crypto	soap
dozer	syslog
flatpack	tidy markup
gzip	xml beans
hl7	xml security
jaxb	xstream
jibx	zip

http://camel.apache.org/data-format.html

Whats included in the box?

- 16 Expression Languages

BeanShell	PHP
EL	Python
Groovy	Ruby
JavaScript	Simple
JoSQL	SpEL
JSR 223	SQL
OGNL	XPath
MVEL	XQuery

http://camel.apache.org/languages.html

Whats included in the box?

- DSL in multiple flavors

```
<route>
  <from ref="A"/>
  <filter>
    <xpath>/quote/product = ‘widget’</xpath>
    <to ref="B"/>
  </filter>
</route>
```

Java
```
from(A).filter(isWidget).to(B);
```

Scala
```
from(A) filter(isWidget) --> B
```

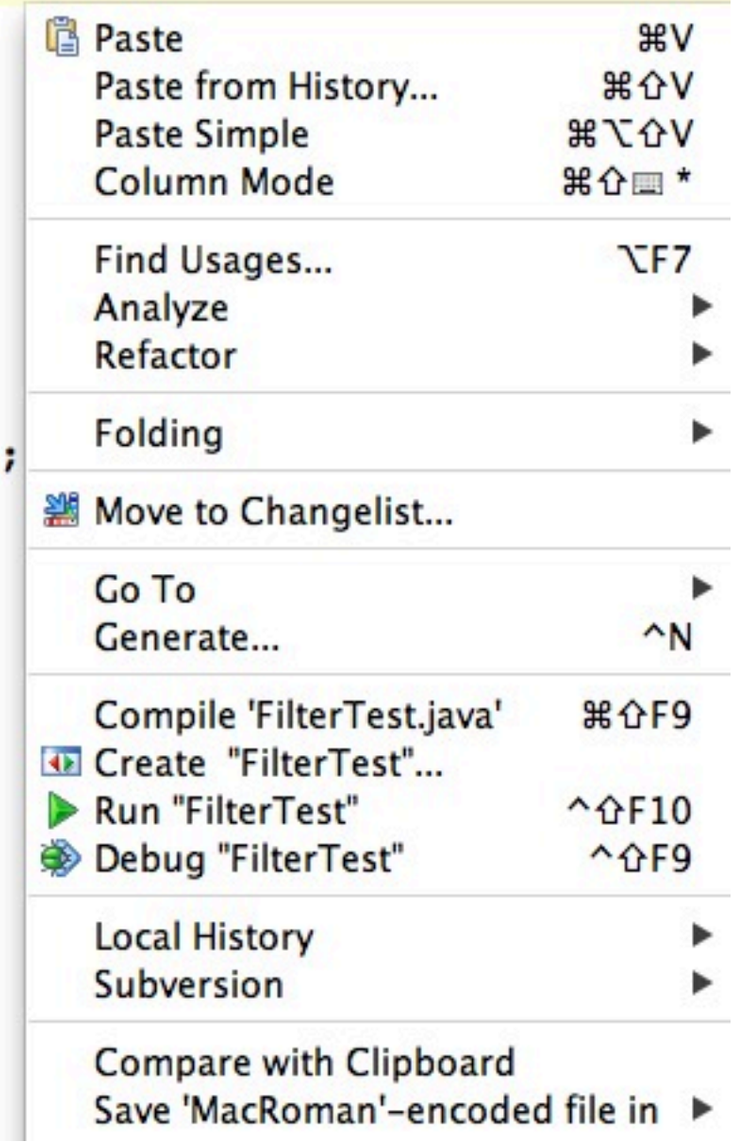
Whats included in the box?

- Test Kit
  - JUnit
  - TestNG
  - Supports Spring
  - Support Blueprint
  - Easy to test
  - Quick prototyping

Whats included in the box?

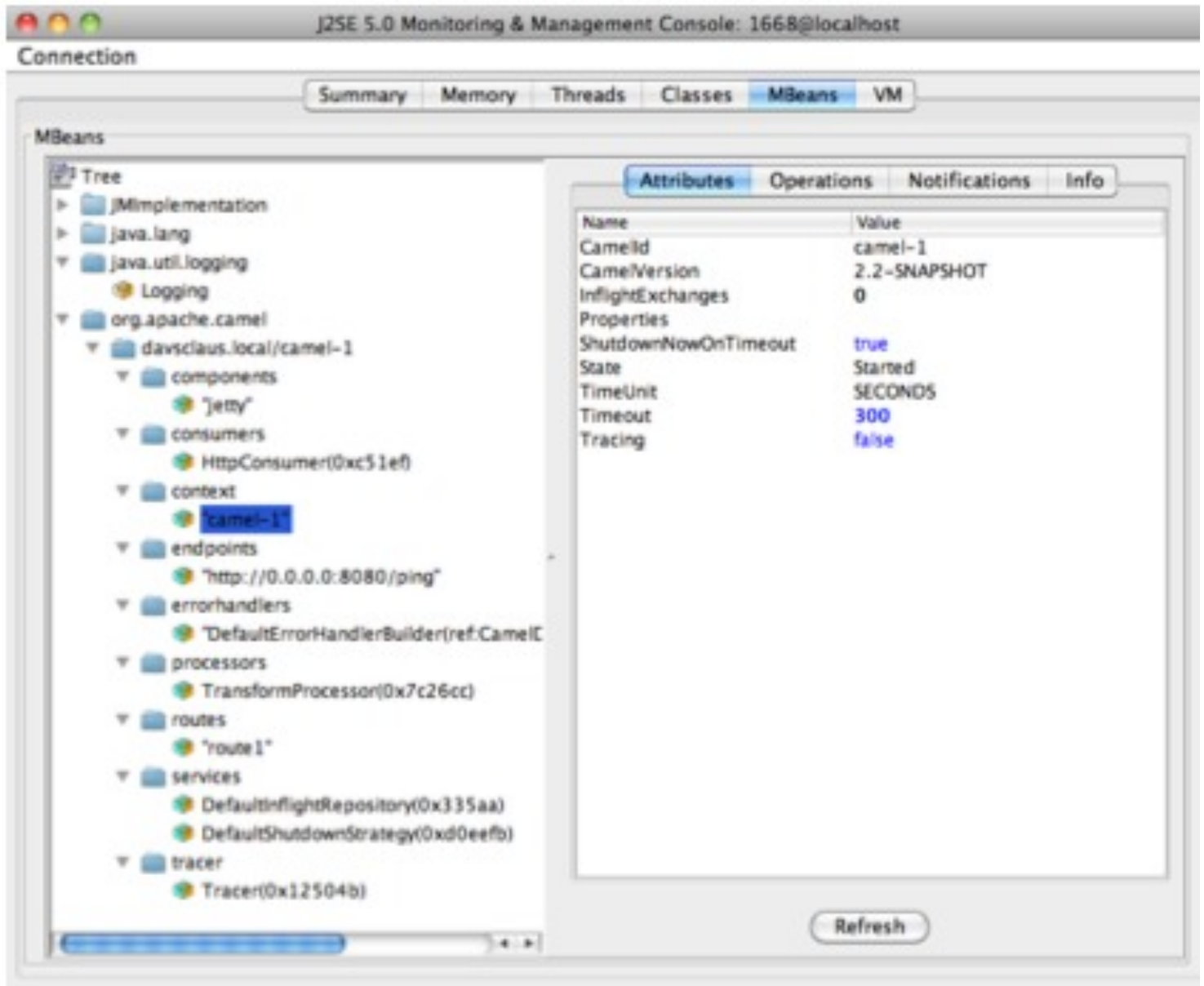
- Test Kit from IDE

```
public class FilterTest extends CamelTestSupport {

    @EndpointInject(uri = "mock:result")
    protected MockEndpoint resultEndpoint;

    @Produce(uri = "direct:start")
    protected ProducerTemplate template;

    public void testSendMatchingMessage() throws Exception {
        resultEndpoint.expectedBodiesReceived("<matched/>");

        template.sendBodyAndHeader("<matched/>", "foo", "bar");

        assertMockEndpointsSatisfied();
    }

    @Override
    protected RouteBuilder createRouteBuilder() {
        return new RouteBuilder() {
            public void configure() {
                from("direct:start")
                    .filter(header("foo").isEqualTo("bar"))
                        .to("mock:result");
            }
        };
    }
}
// END SNIPPET: example
```



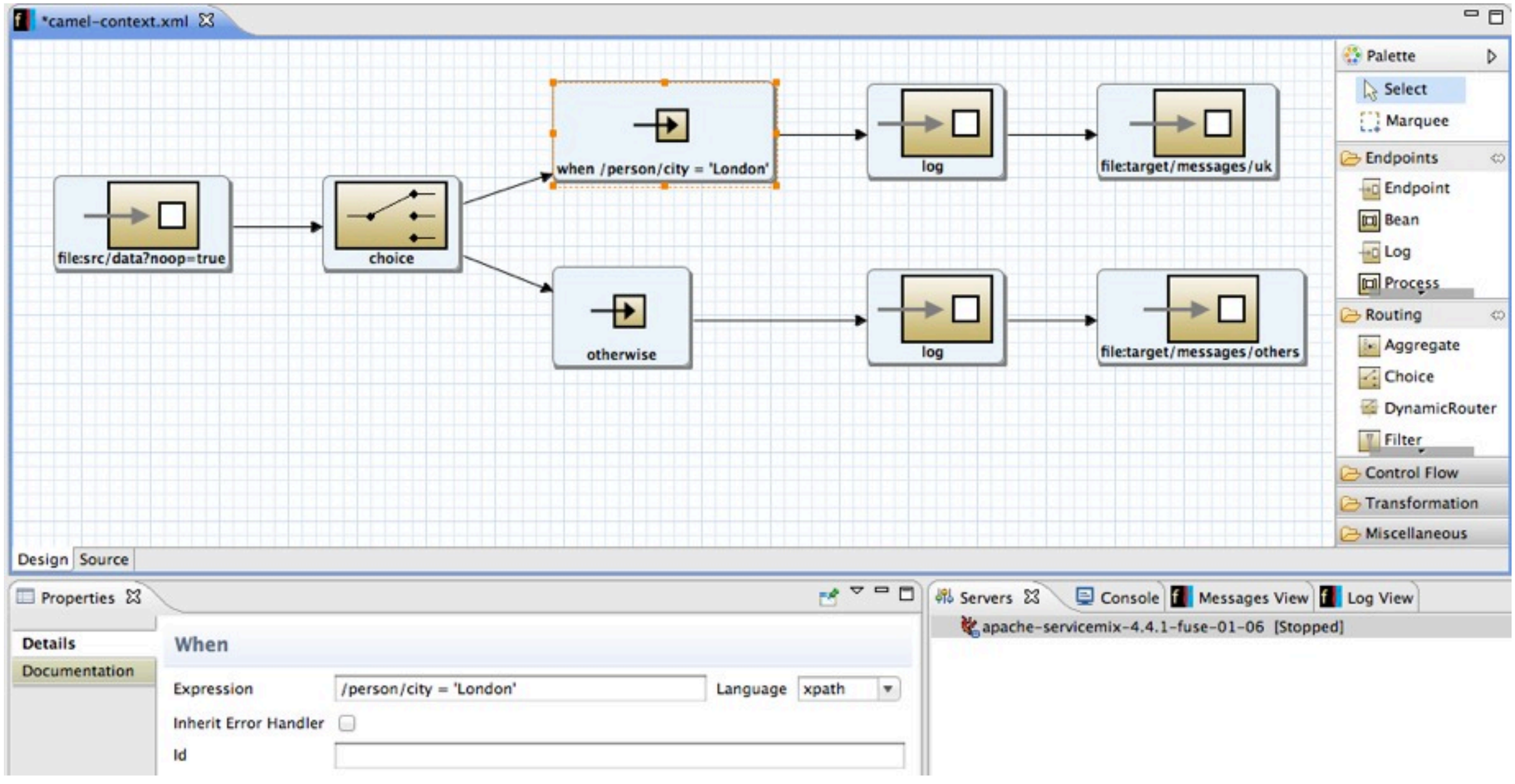
Whats included in the box?

- Managed
  - JMX API
  - REST API



Graphical Tooling

- Eclipse - Fuse IDE (http://fusesource.com)



Whats included in the box?

- Error Handling
  - Errors happen

Whats included in the box?

- Error Handling
  - Try ... Catch style

```
from("activemq:incoming")
   .doTry()
      .marshal().jaxb()
      .to("mq:QueueWithXmlMessages")
  .doCatch(Exception.class)
      .to("activemq:error")
  .end();
```

Whats included in the box?

- Error Handling
  - Dead Letter Channel EIP

```
errorHandler(
   deadLetterChannel("activemq:error")
);

from("activemq:incoming")
   .marshal().jaxb()
   .to("mq:QueueWithXmlMessages");
```

Whats included in the box?

- Error Handling
  - Dead Letter Channel EIP w/ Redelivery

```
errorHandler(
   deadLetterChannel("activemq:error")
      .maximumRedeliveries(5)
      .redeliveryDelay(5000)
);

from("activemq:incoming")
   .marshal().jaxb()
   .to("mq:QueueWithXmlMessages");
```

Whats included in the box?

- Error Handling
  - Camel End User Experience (March 2012)

Borut Bolčina borut.bolcina@gmail.com via camel.apache.org

to users

I really can't describe the awesome felling when I can remove 7 lines of code and replace it with one!

```
onException(BeanValidationException.class)
.handled(true)
 .log("Weather station '${body.station}' does not meet validation
constraints ${exception.message}. Skipping.");
```

Camel feels more and more concise, great.

Agenda

- Your speaker
- What is Apache Camel?
- A little example
- Whats included in the box?
- **Running Camel**
- Live Demos
- Q and A

Running Camel

- Deployment Strategy
  - No container dependency
  - Lightweight
  - Embedable
- Deployment Options
  - Standalone
  - WAR
  - Spring
  - JEE
  - OSGi
  - Cloud

Known Containers

Fuse ESB
Fuse Message Broker
Tomcat
Jetty
JBoss
IBM WebSphere
Oracle WebLogic
Oracle OC4j
Glassfish
Google App Engine
Amazon EC2
... others

Running Camel

- Java Application

```
CamelContext context = new DefaultCamelContext();
context.addRoutes(new MyRouteBuilder());
context.start();
```

Running Camel

- Java Client Application (no routes)

```
CamelContext context = new DefaultCamelContext();
ProducerTemplate template = context.createProducerTemplate();

String data = ...
String fileName = ...

String uri = "ftp://myserver?username=foo&password=secret";
template.sendBodyAndHeader(uri, data, Exchange.FILE_NAME, fileName);
```

Running Camel

- Spring Application

```
<beans xmlns="http://www.springframework.org/schema/beans">

  <camelContext xmlns="http://camel.apache.org/schema/spring">
    <route>
      <from uri="file:/orders"/>
      ...
    </route>
  </camelContext>

</beans>
```

Running Camel

- Spring-DM (OSGi) Application

```
<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xmlns:osgi="http://www.springframework.org/schema/osgi"
       xsi:schemaLocation="
       http://www.springframework.org/schema/beans http://www.springframework.org/schema/beans/spring-beans.xsd
       http://www.springframework.org/schema/osgi http://www.springframework.org/schema/osgi/spring-osgi.xsd
       http://camel.apache.org/schema/spring http://camel.apache.org/schema/spring/camel-spring.xsd">

  <camelContext xmlns="http://camel.apache.org/schema/spring">
    <route>
      <from uri="timer:foo?period=5000"/>
      <setBody>
          <constant>Hello World</constant>
      </setBody>
      <log message="The message contains ${body}"/>
    </route>
  </camelContext>

</beans>
```

Running Camel

- OSGi Blueprint Application

```
<blueprint xmlns="http://www.osgi.org/xmlns/blueprint/v1.0.0"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xsi:schemaLocation="
      http://www.osgi.org/xmlns/blueprint/v1.0.0 http://www.osgi.org/xmlns/blueprint/v1.0.0/blueprint.xsd
      http://camel.apache.org/schema/blueprint http://camel.apache.org/schema/spring/camel-blueprint.xsd">

  <camelContext xmlns="http://camel.apache.org/schema/blueprint">
    <route>
      <from uri="timer:foo?period=5000"/>
      <setBody>
          <constant>Hello World</constant>
      </setBody>
      <log message="The message contains ${body}"/>
    </route>
  </camelContext>

</blueprint>
```

Agenda

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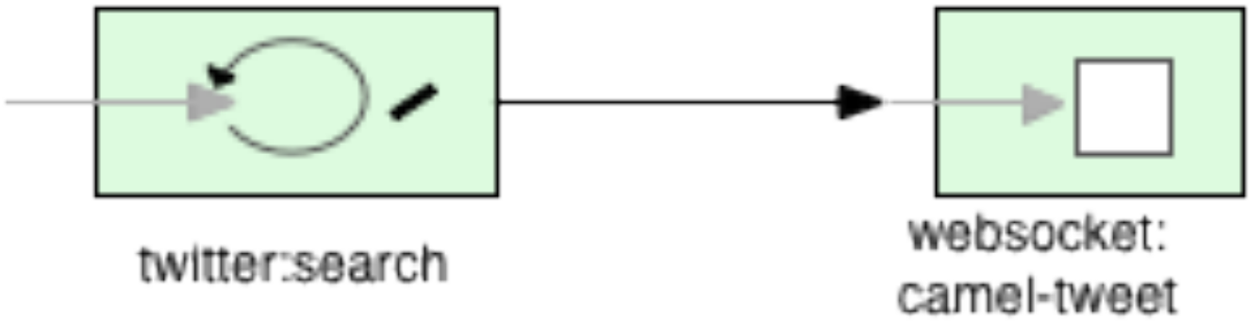
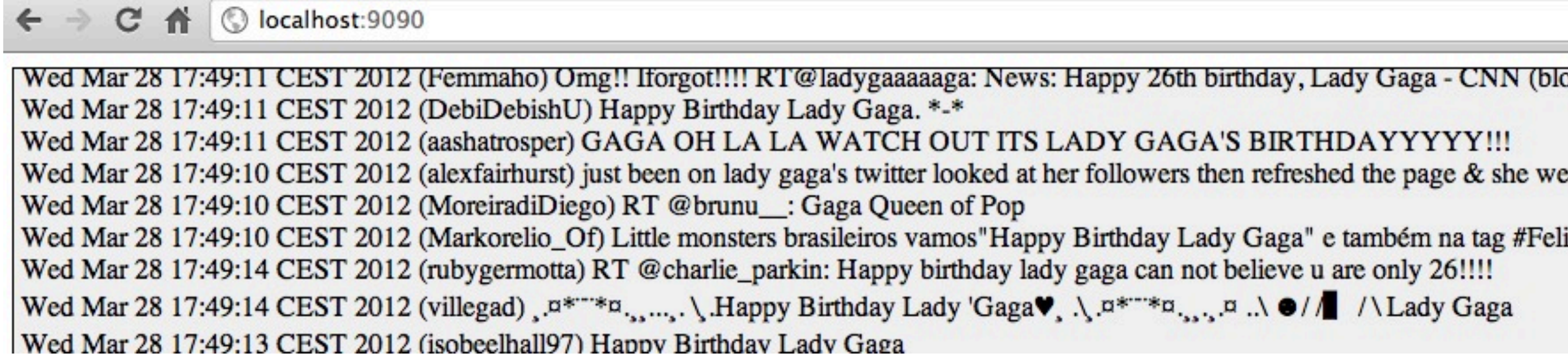
Live Demos

Twitter & Web-Socket Demo

- camel-example-twitter-websocket





examples/camel-example-twitter-websocket$ mvn compile exec:java

Twitter & Web-Socket Demo

```java
/**
 * A main to start this example.
 */
public class CamelTwitterWebSocketMain {

    public static void main(String[] args) throws Exception {
        System.out.println("\n\n\n\n");
        System.out.println("================================================");
        System.out.println("Open your web browser on http://localhost:9090");
        System.out.println("Press ctrl+c to stop this example");
        System.out.println("================================================");
        System.out.println("\n\n\n\n");

        // create a new Camel Main so we can easily start Camel
        Main main = new Main();

        // enable hangup support which mean we detect when the JVM terminates, and stop Camel graceful
        main.enableHangupSupport();

        // add our routes to Camel
        main.addRouteBuilder(new TwitterWebSocketRoute());

        // and run, which keeps blocking until we terminate the JVM (or stop CamelContext)
        main.run();
    }

}
```

Twitter & Web-Socket Demo

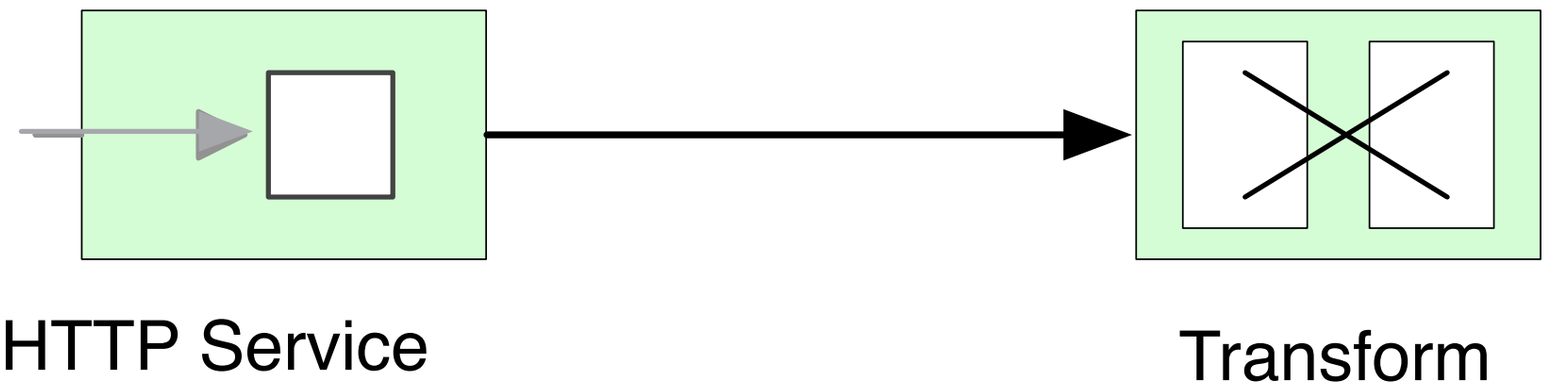
```
@Override
public void configure() throws Exception {
    // setup Camel web-socket component on the port we have defined
    WebsocketComponent wc = getContext().getComponent("websocket", WebsocketComponent.class);
    wc.setPort(port);
    // we can serve static resources from the classpath: or file: system
    wc.setStaticResources("classpath:.");

    // setup Twitter component
    TwitterComponent tc = getContext().getComponent("twitter", TwitterComponent.class);
    tc.setAccessToken(accessToken);
    tc.setAccessTokenSecret(accessTokenSecret);
    tc.setConsumerKey(consumerKey);
    tc.setConsumerSecret(consumerSecret);

    // poll twitter search for new tweets
    fromF("twitter://search?type=polling&delay=%s&keywords=%s", delay, searchTerm)
        // and push tweets to all web socket subscribers on camel-tweet
        .to("websocket:camel-tweet?sendToAll=true");
}
```

Twitter & Web-Socket Demo

```
<script type='text/javascript'>

    if (!window.WebSocket) {
    alert("WebSocket not supported by this browser");
    }

    function $() { return document.getElementById(arguments[0]); }

    var room = {
    join: function(name) {
    this._username=name;
    var location = "ws://localhost:9090/camel-tweet";
    this._ws=new WebSocket(location);
    this._ws.onmessage=this._onmessage;
    this._ws.onclose=this._onclose;
    },

    _onmessage: function(m) {
    if (m.data){
    var chat=$('chat');
    var spanText = document.createElement('span');
    spanText.className='text';
    spanText.innerHTML=m.data;
    var lineBreak = document.createElement('br');
    chat.appendChild(spanText);
    chat.appendChild(lineBreak);
    chat.scrollTop = chat.scrollHeight - chat.clientHeight;
    }
    },

    _onclose: function(m) {
    this._ws=null;
    }

    };

</script>
```

Groovy Demo

- Groovy Script




```
groovy mycamel.groovy
curl http://localhost:8080
```

Groovy Demo

- Groovy Script (mycamel.groovy)

```
import org.apache.camel.builder.RouteBuilder
import org.apache.camel.impl.DefaultCamelContext

@Grab(group="org.apache.camel",module="camel-core",version="2.8.0")
@Grab(group="org.apache.camel",module="camel-jetty",version="2.8.0")
@Grab(group="org.slf4j",module="slf4j-jdk14",version="1.6.1")
class MyRouteBuilder extends RouteBuilder {
  void configure() {
    from("jetty:http://localhost:8080/")
      .to("log:input")
      .transform(constant("Hello from Groovy\n"))
  }
}
```

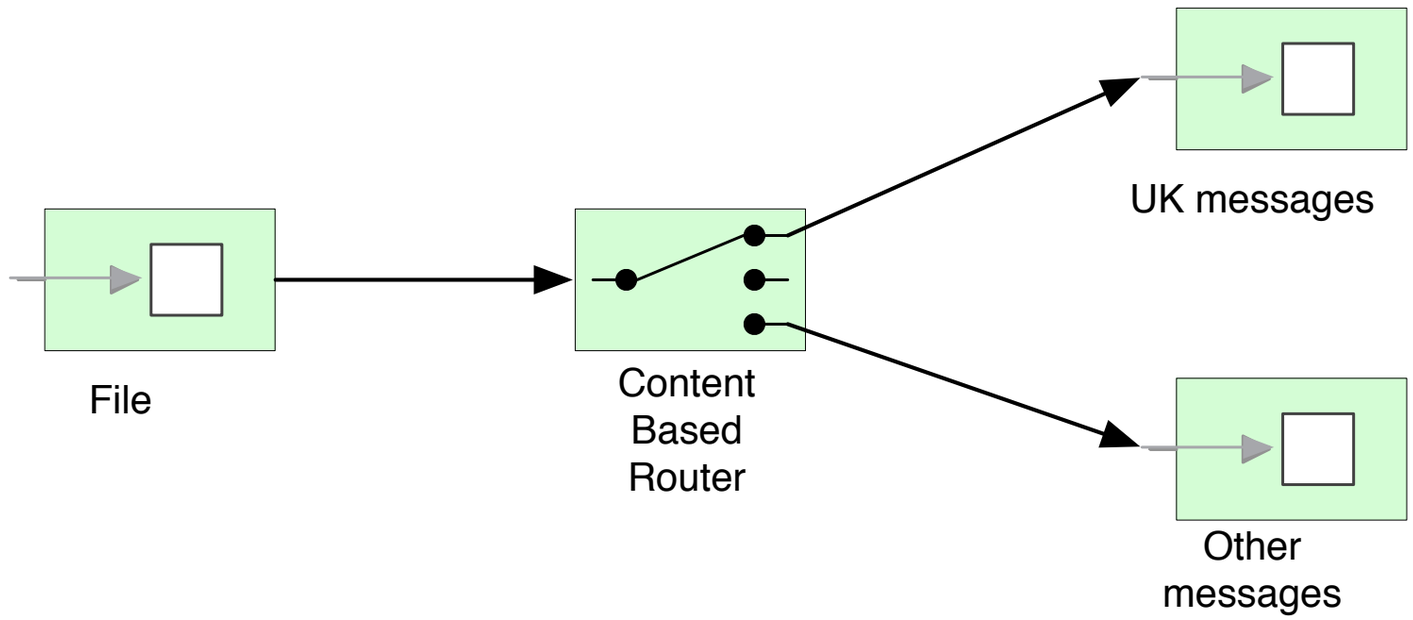
Groovy Demo

- Groovy Script (mycamel.groovy - cont.)

```
...
def camelContext = new DefaultCamelContext()
camelContext.addRoutes(new MyRouteBuilder())

camelContext.start()
System.console().readLine()
camelContext.stop()
```

Create New Project using Maven

- Create new Project using Maven

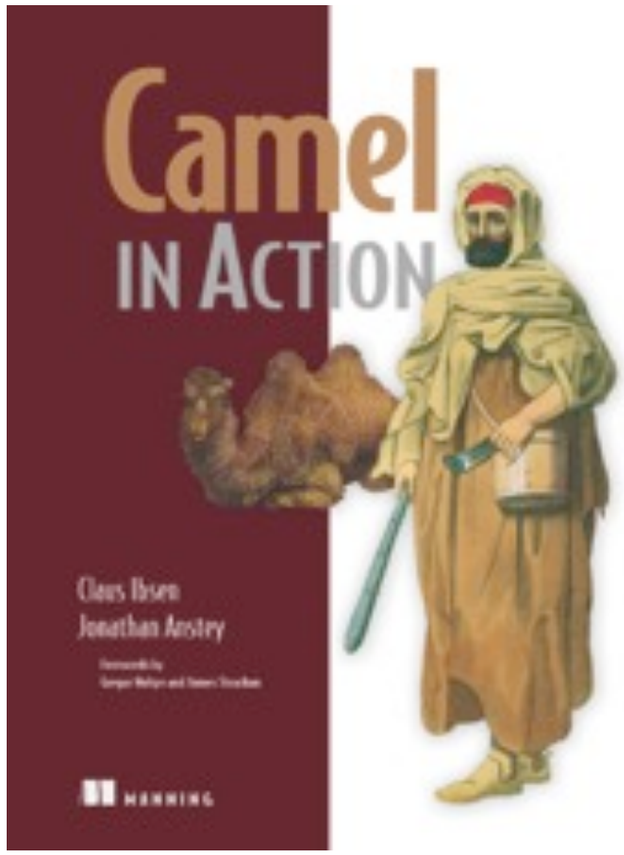



```
mvn archetype:generate
(camel-archetype-spring)
mvn eclipse:eclipse
mvn camel:run
```

Agenda

- Your speaker
- What is Apache Camel?
- A little example
- Whats included in the box?
- Running Camel
- Live Demos
- **Q and A**

Q and A



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