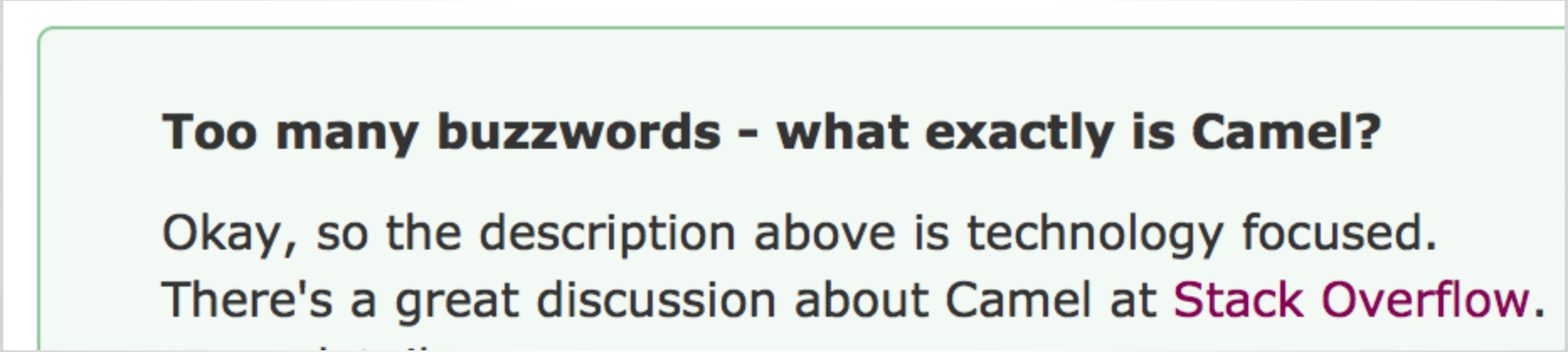
F4: External Integrations

Introducing Camel

What is Camel?

Good question. See: http://camel.apache.org/what-is-camel.html



So really you want see this: http://stackoverflow.com/questions/8845186/what-exactly-is-apache-camel

In short...

- Camel is a framework for creating small message based applications… and then some.
- Camel formalizes working with messages so well it can be described in multiple formats: Java, Spring/Blueprint XML, and Scala.
- Camel is all the code you should not have to write in order to work with queues, files, databases, RESTful APIs, common data formats, command line utilities, etc… in a consistent and reliable manner.

Camel can run...

- As a stand-alone Java application
- In a servlet container like Tomcat or Jetty
- In an OSGi runtime such as Karaf

What is OSGi?

- Open Service Gateway Initiative

- Framework for modularizing and deploying Java applications
  - Hot deployment
  - Automatic reloading of configuration
  - Sophisticated dependency resolution
  - XML scripting for complex deployments (features)

Hot Deployment

Bundles can be started, stopped, updated, etc… at runtime!

In other words:

YOU DO NOT HAVE TO RESTART YOUR SERVER TO UPDATE CODE OR CONFIGURATION

Terminology

- Apache Camel
  - Endpoints
  - Components
  - Messages
  - Routes
- Apache Karaf -- OSGi
  - Bundles
  - Features

Available Camel Components

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

- ActiveMQ
- AWS SQS
- DropBox
- System calls
- Local files
- FTP
- HTTP resources
- LDAP
- SMTP
- SQL
- Twitter
- etc, etc, etc

Hands-On: Gitting the Examples

> vagrant ssh

or:

> ssh -p 2222 vagrant@localhost

password = vagrant

Hands-On: Inspect features

> /opt/karaf/bin/client

>> feature:list | grep fcrepo

fcrepo-camel
fcrepo-indexing-triplestore
fcrepo-audit-triplestore
fcrepo-indexing-solr
fcrepo-reindexing
fcrepo-fixity

Hands-On: Helpful Commands

>> feature:install fcrepo-audit-triplestore

>> feature:stop <whichever>

>> camel:route-list

>> bundle:list | grep fcrepo

>> ctrl-d

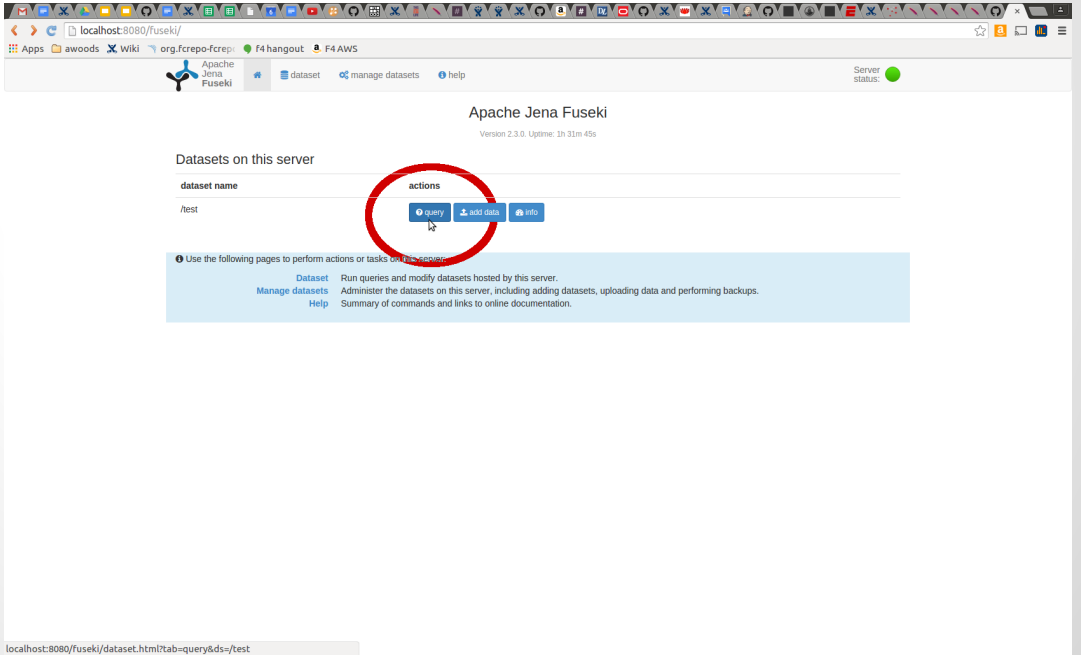
Hands-On: Watch the log

In a new vagrant ssh terminal:

> sudo tail -f /opt/karaf/data/log/karaf.log

Hands-On: Indexing in triplestore

http://localhost:8080/fuseki



Hands-On: Indexing in triplestore

```
select * where {
  <http://localhost:8080/fcrepo/rest/cover> ?p ?o
}
```

Hands-On: Indexing in triplestore

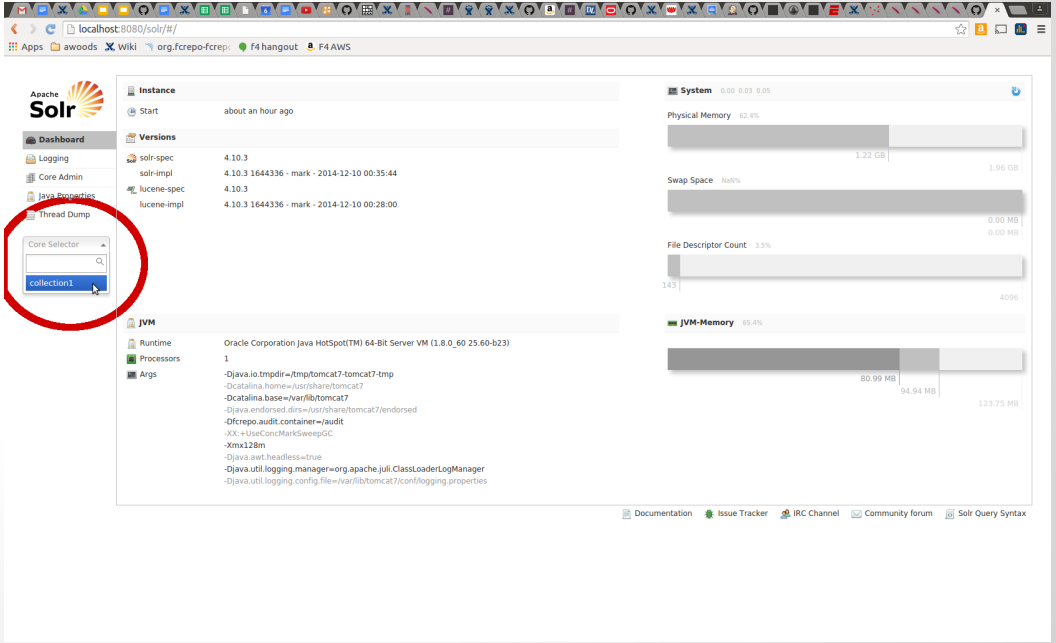
```
PREFIX ldp: <http://www.w3.org/ns/ldp#>
PREFIX ebucore: <http://www.ebu.
ch/metadata/ontologies/ebucore/ebucore#>

select * where {
   ?s ldp:contains ?o .
   ?o ebucore:hasMimeType ?m
}
```

Hands-On: Indexing in triplestore *Audit*

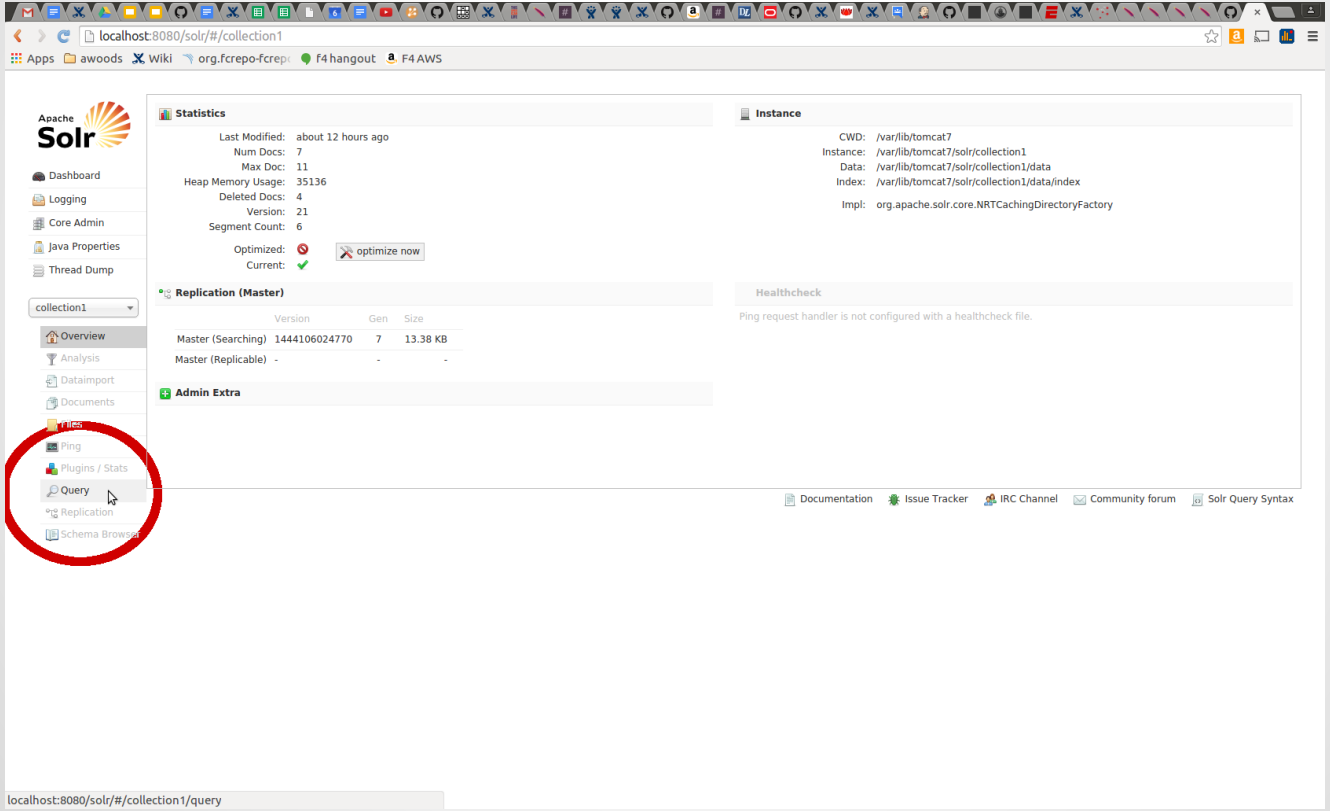
```
prefix premis: <http://www.loc.gov/premis/rdf/v1#>
prefix xsd: <http://www.w3.org/2001/XMLSchema#>

select ?s ?d where {
   ?s ?p <http://fedora.info/definitions/v4/audit#InternalEvent> .
   ?s premis:hasEventRelatedObject <http://localhost:8080/fcrepo/rest/cover> .
   ?s premis:hasEventDateTime ?d .
   FILTER (?d > "2015-10-06T04:21:14Z"^^xsd:dateTime)
}
```

Hands-On: Indexing in Solr

http://localhost:8080/solr



Hands-On: Indexing in Solr



Hands-On: Reindexing - prep

> sudo service tomcat7 stop

> sudo rm -rf /etc/fuseki/databases/test_data/*

> sudo service tomcat7 start

Hands-On: Reindexing

```
> curl -XPOST localhost:9080/reindexing/cover
-H"Content-Type: application/json" -d
'["activemq:queue:triplestore.reindex"]'
```

Hands-On: Fixity

```
> curl -XPOST localhost:9080/reindexing/cover
-H"Content-Type: application/json" -d
'["activemq:queue:fixity"]'

> less /tmp/fixityErrors.log
```

Bonus Round

Git the examples

-- from within vagrant --

> cd

> git clone https://github.com/awoods/fcrepo-camel-workshop.git

Hands-On: Install a Feature

>> feature:install camel-exec

This installs the camel-exec feature...

- which we will use later on for executing command-line utilities.

1 - Make our own “feature”

Use case:

- Whenever a JPEG image is ingested in Fedora, generate a thumbnail

01: Hello World

```
<camelContext id="helloWorld">
    <route id="timerToLog">
        <from uri="timer:foo?period=5000"/>
            <setBody>
                <simple>Hello Whirled!</simple>
            </setBody>
        <to uri="log:demo"/>
    </route>
</camelContext>
```

Deploy the first route

> sudo cp /home/vagrant/fcrepo-camel-workshop/01-HelloWorld.xml /opt/karaf/deploy/

Routes

- Processing pipelines, with beginning and ending points
- Begin with a ‘from’ uri
  - A file
  - A queue
  - A timer
  - Another route
- Other routes are called by using ‘to’ and a uri
  - <to uri=”direct:myRoute”/>

Camel Components / Endpoints

- From previous example
  - “timer:foo?period=5000”
- Prefixes in camel URIs are Components
- Components provide endpoints for communicating with other software
- Two types of endpoints
  - Producer
  - Consumer
- Options can be provided

Component: fcrepo-camel

- fcrepo-camel project provides an F4 component
- Used as a producer to interact with F4's REST API
- URIs look like
  - fcrepo:hostname[:port][/resourceUrl][?options]
- Used as a consumer to handle messages published by F4

02: Responding to Fedora events

```
<route id="thumbnailRouter">
    <from uri="activemq:topic:fedora"/>
    <log message="GOT A MESSAGE FROM FEDORA"/>
    <log message="HEADERS: ${headers}"/>
</route>
```

Anatomy of a Message

- Body
  - The main content of message. Can be any text or binary data type:
    - html, json, xml, etc…
    - image, audio, video, etc…

- Headers
  - Key/Value properties for the message
    - HTTP: Accept, Content-Type, etc…
    - JMS: Timestamp, Expiry, Destination, etc…

Fedora Headers

- org.fcrepo.jms.baseURL
- org.fcrepo.jms.identifier
- org.fcrepo.jms.eventType
- org.fcrepo.jms.properties
- org.fcrepo.jms.timestamp
- and more…

03: Getting RDF from Fedora

```
<route id="thumbnailRouter">
    <from uri="activemq:topic:fedora"/>
    <to uri="fcrepo:localhost:8080/fcrepo/rest"/>
    <log message="${body}"/>
</route>
```

Watch out!

If you are scripting in XML, remember that you are still in XML! ...and have to escape your xml entities.

So things like:

- x < y
- this && that

Become:

- x < y
- this && that

04: Filtering using headers

```
<from uri="activemq:topic:fedora"/>
  <filter>
      <simple>
        ${header[org.fcrepo.jms.eventType]} != 'http://fedora.info/definitions/v4/repository#NODE_REMOVED' &amp;amp;&amp;amp;
        ${header[org.fcrepo.jms.properties]} contains 'http://fedora.info/definitions/v4/repository#hasContent'
      </simple>
      <log message=”Got an upsert event with content!”
</filter>
```

05: Filtering on body content

```
<route id="thumbnailRouter">
    <from uri="activemq:topic:fedora"/>
    <to uri="fcrepo:localhost:8080/fcrepo/rest"/>
    <setProperty propertyName="mimetype">
        <xpath>/rdf:RDF/rdf:Description/ebucore:hasMimeType/text()</xpath>
    </setProperty>
    <filter>
        <simple>${property.mimetype} == 'image/jpeg'</simple>
        <log message="JPEG!"/>
     </filter>
</route>
```

06a: Getting Non-Rdf Content

```
<route id="thumbnailRouter">
    <from uri="activemq:topic:fedora"/>
    <to uri="fcrepo:localhost:8080/fcrepo/rest?metadata=false"/>
    <log message="${body}"/>
</route>
```

06b: Generating a Thumbnail

```
<route id="thumbnailGenerate">
    <from uri="activemq:topic:fedora"/>
    <to uri="fcrepo:localhost:8080/fcrepo/rest?metadata=false"/>
    <to uri="exec:convert?args=-thumbnail 100x100 - png:-"/>
    <log message=”THUMBNAIL: ${body}”/>
</route>
```

Put it all together

- Ingest a JPEG file
- Derivative thumbnail at /tmp/cover/<>.png
- View thumbnail:

  > cp /tmp/cover/<>.png /vagrant
- View <>.png outside of vagrant

Success!