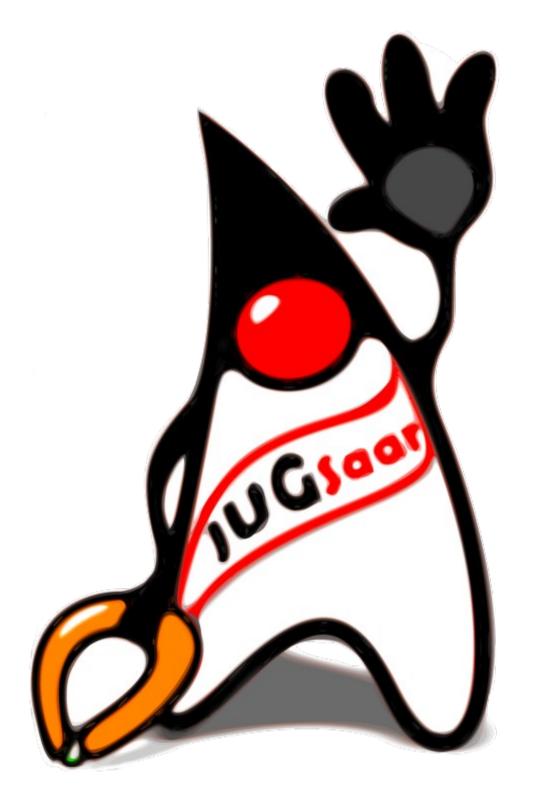
JUG Saarland Meetup 27

Apache Camel

a versatile open-source integration framework

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Agenda







- What are Enterprise Integration Pattern?
- What is Apache Camel?
- What does Apache Camel provide to us?
- Apache Camel architecture
- Supported components and data formats
- Deployment model
- Tools and examples

What is Enterprise Application Integration?

Enterprise Application Integration is not a single tool it rather describes the process of linking enterprise applications within a single organization together. With the goal to simplify and automate business processes. While at the same time avoiding having to make changes to existing applications or data structures.

Enterprise Integration is not an easy task. As it has to deal with:

- ... multiple applications
- ... running on multiple platforms
- ... in different locations
- ... processing data in different formats

Example for common problems

Assuming a company selling electronic parts with one local store.

- order processing and billing happen in the local store
- all steps are handled by a custom POS software

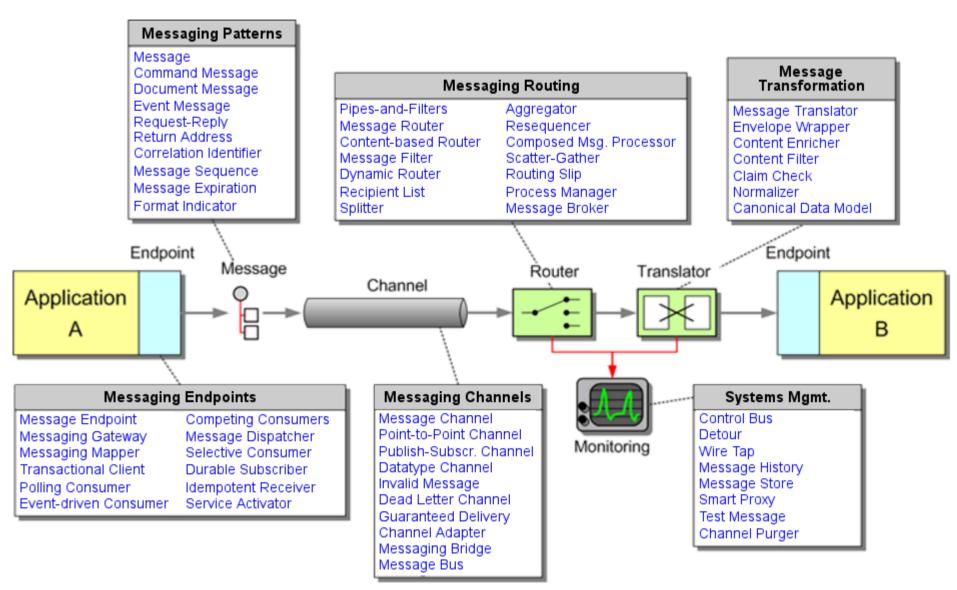
After the company rises she might need to solve following:

- orders coming from different media, e.g. email, website, ...
- shipping goods to the customer or other stores
- billing address differ from shipping address

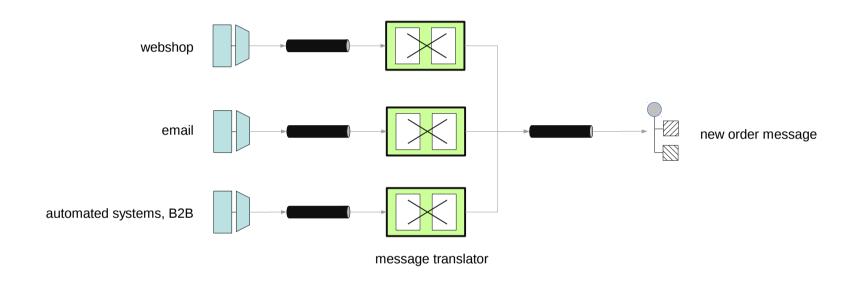
What are Enterprise Integration Pattern?

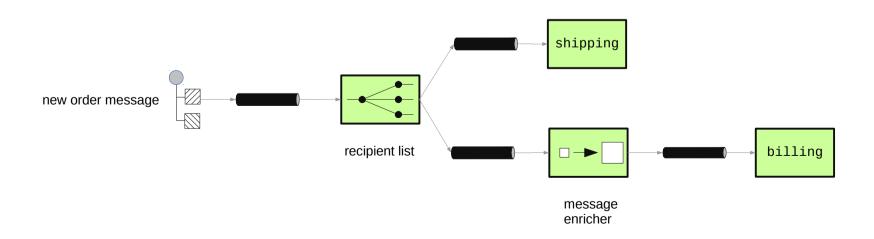
- Design pattern for Enterprise Application Integration and message oriented middleware
- 9 categories
 - Integration Styles file transfer, shared database, ...
 - Integration Types information portal, data replication, ...
 - Messaging Systems channels, pipes and filters, ...
 - Message Channel point-to-point, publish-subscribe, ...
 - Message Construction command message, event message, ...
 - Message Router content-based-router, message-filter, ...
 - Message Transformation content enricher, claim check, ...
 - Messaging Endpoints polling / event-driven consumer, ...
 - System Management detour, wire tap, ...

Messaging pattern



Example for common problems





EIP pattern examples



Content based router – pass messages depending on conditions



Splitter – message contains multiple elements, to be processed in a different way



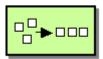
Content enricher – originator does not have all required data



Message translator – systems using different data formats to communicate



Message filter – avoid receiving uninteresting messages



Resequencer - get a stream of related but out-of-sequence messages back into the correct order

EIP - theory and praxis

- Enterprise Integration Pattern provide the theory
- one implemented solution is Apache Camel



What is Apache Camel?

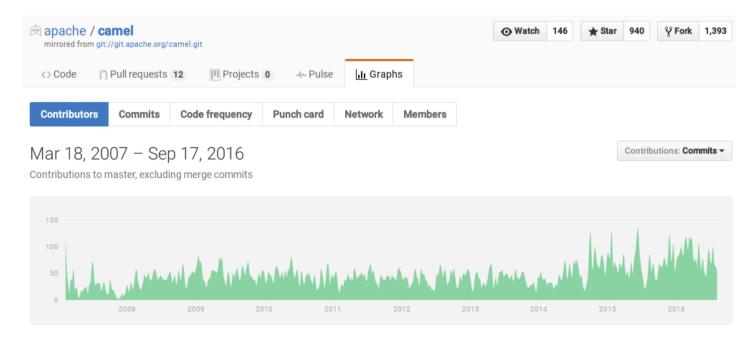
Quotation from the webpage (http://camel.apache.org)

Apache Camel is a versatile open-source integration framework based on known Enterprise Integration Patterns.

- entirely framework is written in Java
- routing and mediation rules are defined in a domain specific language (Java, Spring/Blueprint XML, Scala)

History of Apache Camel

- 2003 Gregor Hohpe and Bobby Wolf published the book "Enterprise Integration Pattern"
- 2007 first commit from James Strachan (creator of Groovy)
- actual version is 2.17
- more then 230 contributors on https://github.com/apache/camel



Why the name Camel?

it stands for

Concise
Application
Message
Exchange
Language

- other explanations:
 - some members of the team used to love Camel® cigarettes
 - the name is short, simple and easy to remember
 - ...
 - more on http://camel.apache.org/why-the-name-camel.html

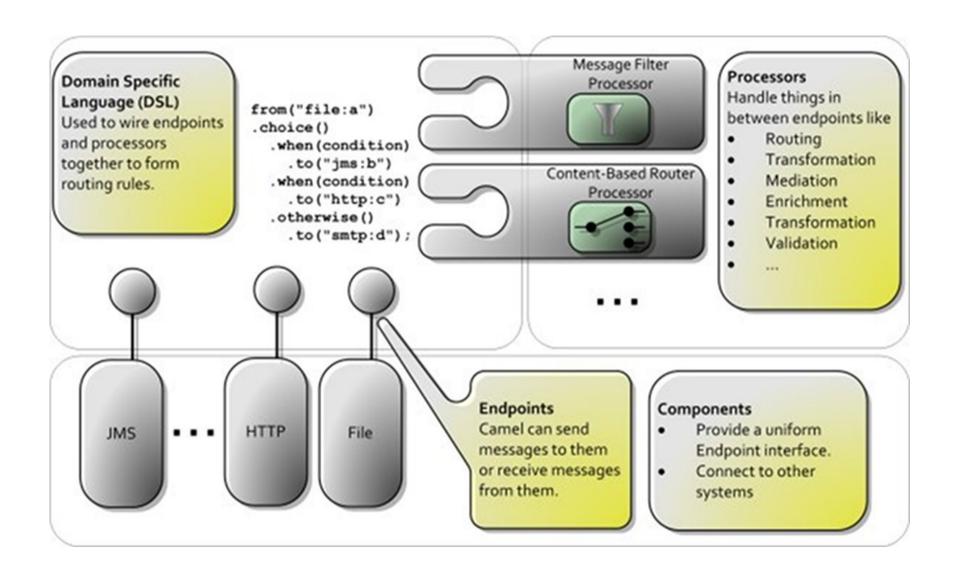


What does Apache Camel provide to us?

- A framework which let us focus on business problems
- Minimize dependencies between integrated applications
- A large set of components and supported data formats prevent us from reinventing the wheel
- Its modular architecture allows to plugin own component or data format
- A test kit for unit and integration testing



Camel architecture



Supported components

current 184 components addressable via an URI

```
- amgp (ActiveMQ, RabbitMQ, MQTT, ...)
- aws (EC2, SNS, S3, ...)
- cassandra

    cxf (JAX WS/JAX RS, REST)

- direct (endpoint in the same Camel Context)
- direct-vm (endpoint in the same JVM)
- docker
- dropbox
- ejb
- elasticsearch
- file
- ftp
- ...
```

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

Apache Camel Components

tomating Tasks Component / ArtifactId / URI	Description	Component / ArtifactId / URI	Description	Component / ArtifactId / URI	Description	Persistence Component / ArtifactId / URI	Description	Special support Component / Artifactid / URI	Description
r/camel-core in org.apache.activemq er:timerNameEf <options>3</options>	Used to generate message exchanges when a timer fires. Events can only be consumed from	JBI / servicemix-camel in org.apache.servicemix ibi:serviceNameEfcoptions>3	For Java Business Integration (JBI) integration such as working with Apache ServiceMix.	LDAP/camel-idap idap:hostNameE:portJEf <options>3</options>	Performing searches on Lightweight Directory Access Protocol (LDAP) servers.	CouchDB/camel-couchdb couchdb:hostNameE:port3/databaseEf <options>3</options>	To integrate with Apache CouchDB.	Cache/camel-cache cache!//cacheNameEf <options>3</options>	The cache component facilitate caching endpoints and processors as the cache implementation.
tz / camel-quartz	this endpoint.	NMR / apache-servicemix-nmr in org.apache.servicemix.nmr		Soring LDAP / camel-spring-ldap		Db4e / camel-db4e in camel-extra		Georgier / ramel-peorgier	
rtz://groupName/timerNameEf <options>3</options>	Provides a scheduled delivery of messages using the Guartz 1.x scheduler.	nmr://serviceNameEf <options>1</options>	Integration with the Normalized Message Router bus in Apache ServiceMix.	spring-ldap:springLdapTemplateBeanEf <options>3</options>	Camel wrapper for Spring LDAP. Spring LDAP is a Java library for simplifying LDAP operations, based on the pattern of Spring's AlbcTemplate.	dbWo://classNameEf <options>3</options>	For using a db4o datastere as a queue via the db4o (database for objects) library.	geocoder: <address(lating:latitude.longitude> Ef<options>1</options></address(lating:latitude.longitude>	Supports looking up geocoders for reverse lookup geocoders from an
tz2/camel-quartz2 rtz2://groupName/timerNameEf <options>3</options>	Provides a scheduled delivery of messages using the Quartz 2.x scheduler.	Vert.x/camel-vertx vertx:eventBusName	Working with the Vert.x event bus.	Mail		EJB/camel-ejb ejb:ejbNameEf <options>1</options>	Uses the Bean Binding to bind message exchanges to Enterprise Java Beans (EJBs). It works like the Bean component but just for accessing EJBs. Supports EJB 3.0 onwards.	Hazelcast / camel-hazelcast hazelcast://Etype3:cacheNameEf <options>3</options>	Hazelcast is a data grid supporting of SEDA, queue, set, atomic numb
nazon		Feeds		Component / ArtifactId / URI	Description	HBase / camel-hbase	For reading/writing from/to an HBase store	RCode / camel-rcode in camel-extra	Uses Reerve to integrate Carnel wi
Component / ArtifactId / URI	Description	Component / ArtifactId / URI	Description	imap://Eusername@lhostNameE:portlEf <options>l</options>	Receiving email using Internet Message Access Protocol (IMAP).	hbase://tableEf <options>1</options>	(Hadoop database).	rcode://hostNameE:port3/operationE? <options>3</options>	environment R.
W / camel-aws	For working with Amazon's CloudWatch (CW).	Atom / camel-atom atom:atomUniEf <options>3</options>	Working with Apache Abdera for atom integration, such as consuming an atom feed.	<pre>IMAPS / camel-mail imaps / / Eusername@3hostNameEiport3Ef<options>3</options></pre>	Receiving email using secured IMAP.	Hibernate / camel-hibernate in camel-extra hibernate://entityNameEf <options>3</options>	For using a database as a queue via the Hibernate library.	Routebox / camel-routebox	Facilitates the creation of speci that offer encapsulation and based indirection service to a co routes hosted in an automatically
ddb://tableNameEf <options>3</options>		RSS / camel-rss	Working with ROME for Rich Site Summary (RSS)	POP3 / camel-mail	Receiving email using Post Office Protocol (POP3)	iBATIS / camel-ibatis		routebox!routeBoxNameEf <options>3</options>	routes hosted in an automaticall
ddb://tableNameEf <options>1</options>	For working with Amazon's DynamoDB (DDB).	rss:uriEf <options>]</options>	integration.	pop3://Eusername@3hostName port3E? <options>3</options>	and JavaMail.	ibatis://statementNameEf <options>3</options>	Performs a query, poll, insert, update or delete in a relational database using Apache (BATIS.	Weather / camel-weather	Polls the weather information fro
SDB/camel-aws sdb://domainNameEf <options>1</options>	For working with Amazon's SimpleDB (SDB).	File I/O and Transfer		POP35 / camel-mail non3x://Eusername@lhoxtName.nort1Ef <cotionx>1</cotionx>	Receiving email using secured POP3 and JavaMail.	JDBC/camel-jdbc idbc:dataSourceNameEf <options>3</options>	For performing Java Database Connectivity (JDBC) queries and operations.	weather://nameE? <options>3</options>	Мар.
ES / camel-aws		Component / Artifactid / URI	Description	SMTP / camel-mail	Sending email using Simple Mail Transfer Protocol	JPA / camel-ipa		Spring	
ses://fromEf <options>3</options>	For working with Amazon's Simple Email Service (SES).	Fite / camel-core	Sending messages to a file or polling a file or directory.	smtp://Eusername@lhostNameE:portlEf <options>l</options>	[SMTP] and JavaMail.	jpa://entityNameEf <options>3</options>	For using a database as a queue via the Java Persistence API (JPA) specification for working with OpenJPA, Hibernate or TopLink.	Component / Artifactid / URI Spring Event / camel-spring	Description
NS/camel-aws sns://topicNameEf <options>3</options>	For Messaging with Amazon's Simple	file://nameOfFileOrDirectoryEf <options>3</options>	directory.	SMTPS / camed-mail smtps://Eusername@lhostNameE:port1Ef <options>l</options>	Sending email using secured SMTP and JavaMail.	Krati / camel-krati	For producing to or consuming to Krati datastores.	spring-event://default	Working with Spring Application
OS / camel-aws	The state of the s	Flatpack/camel-flatpack flatpack:Efixed!delim3:configFileEf <options>3</options>	Processing fixed width or delimited files or messages using the FlatPack library.			krati://datastorePathEf <options>3</options>		Spring Batch / camel-spring-batch	To bridge Carnel and Spring Bat
sqs://queueNameEf <options>3</options>	For Messaging with Amazon's Simple Queue Service (SQS).	FTP / camel-ftp	Sending and receiving files over File Transfer Protocol (FTP).	Maintenance and Monitoring		MongoDB / camel-mongodb	Interacts with MengoDB databases and collections. Offers producer endpoints to perform CRUD- style operations and more against databases and	spring-batch:jobNemeEf <options>I</options>	
3/camel-aws s3://bucketNameEf <options>3</options>	For working with Amazon's Simple Storage Service (S3).	ftp:contextPathEf <options>l FTPS/camel-ftp</options>	Protocol (FTP).	Component / ArtifactId / URI	Description Provides a simple BrowsableEndpoint which can be	mongodb:connectionBeanEf <options>3</options>	style operations and more against databases and collections, as well as consumer endpoints to listen on collections and dispatch objects to Camp creates	spring-integration:defaultChannelNameE	The bridge component of C Integration.
		ftps://Eusername@lhostNameE:portl/ directoryNameE? <options>l</options>	Sending and receiving files over FTP Secure (TLS and SSL).	Browse / camel-core browse : someName	Provides a simple BrowsableEndpoint which can be useful for testing, visualisation tools or debugging. The exchanges sent to the endpoint are all available	HyBatis / camel-mybatis	Performs a query, poll, insert, update or delete in a relational database using MyBatis.	Spring Redis / camel-spring-redis spring-redis://hostName:portE? <options>3</options>	Component for consuming and Redis key-value store.
sics		directoryNameEf <options>3 HDFS/cameL-hdfs</options>		ControlBus / camel-core	Controlling FIP that allows to send messages	mybatis://statementNameEf <options>3</options>			neus key-value store.
Component / ArtifactId / URI	Description	hdfs://hostNameE:port3E/path3Ef <options>3</options>	For reading/writingfrom/to an Hadoop Distributed File System (HDFS) filesystem.	controlbus:commandEf <options>1</options>	to Endpoints for managing and monitoring your Camel applications.	SQL/camel-sql sql:queryCommandEf <options>3</options>	Performing Structured Query Language (SQL) queries using JDBC.	Templates	Service of the Servic
camel-core beanNameEf <options>1</options>	Uses the Bean Binding to bind message exchanges to beans in the Registry. Is also used for exposing and invoking Plain Old Java Objects	SCP / camel-jsch	Support for the scp protocol using the Client API of the Java Secure Channel (JSch) project.	JMX/camel-jmx jmx!//platformEf <options>3</options>	For working with Java Management Extensions	Spring Neo4j / camel-spring-neo4j in camel-extra		Component / ArtifactId / URI	Descriptio
	(POJOS).	scp://hostNameE:port3/destinationEf <options>3 SFTP/camel-ftp</options>		jmx1//platformEfCoptions>3 Log/camel-core	(JMA) redrication disteners.	spring-neo4j!http://hostNameE!port3/ databaseEfoptions3	Component for producing to Neo4j datastore using the Spring Data Neo4j library.	FreeMarker/camel-freemarker freemarker:templateNameEf <options>3</options>	Generates a response usin template.
camel-core :classNameEf <options>3</options>	Uses the Bean Binding to bind message exchanges to beans based on the class name. Is also used for exposing and invoking POJOs.	sftp://Eusername@lhostNameE:portl/ directoryNameEf <coptions>1</coptions>	Sending and receiving files over FTP Secure (FTP and SSH).	log:loggingCategoryEf <options>3</options>	Uses Jakarta Commons Logging to log the message exchange to some underlying logging system tike logsj.			Mustache / camel-mustache	Generates a response using a
t / camel-context	Used to refer to endpoints within a separate	directoryNameEf <options>1 Stream/camel-stream</options>		Nagios / camel-nagios	Sending passive checks to Nagios using JSendNSCA. Nagios supports IT Infrastruture	Platform Support		mustache:templateNameEf <options>3 MVEL/camel-mvel</options>	Generator a reserve
<pre>ct/camel-context text:3camelContextId:localEndpointNameE* ions>3</pre>	Used to refer to endpoints within a separate CamelCentext to provide a simple black box composition approach so that reutes can be combined into a CamelContext and then used	stream: <inlout err file header url>Ef<options>l</options></inlout err file header url>	Read or write to an input/output/error/file stream rather like unix pipes.	nagios://hostNameE:port3Ef <options>3 SNMP/camed-snmp</options>	Monitoring.	Component / ArtifactId / URI	Description	mvel:templateNameEf <options>1</options>	Generates a response us Expression Language (MVEL) I
ions>3	as a black box component inside other routes in other CamelContext.	Google		snmp!//hostNameE!port3Ef <options>3</options>	Polling OID values and receiving traps using SNMP via SNMP4J library.	Activiti/activiti-camel activiti/camelProcess/serviceTask	For working with Activiti, a light-weight workflow and Business Process Management (BPM) slatterm which supports RPMN 2.	Scalate / scalate-camel in org.fusesource.scalate	Generates a response using a
rmat / camel-core	For working with Data Formats as if it was a regular Component supporting Endpoints and URIs.	Component / Artifactid (IIR)	Description	Manager		APNS / camel-agns		scalate(templateName	
ormat:name: <marshallunmarshal>Ef<options>I</options></marshallunmarshal>	Component supporting Endpoints and URIs.	GAuth / camel-gae	Used by web applications to implement an OAuth	Messaging	Description	apns/ <notify consumer="">Ef<options>3</options></notify>	For sending notifications to Apple iOS devices.	StringTemplate / camel-stringtemplate string-template:templateNameEf <options>1</options>	Generates a response using a
amel-exec //executableEf <options>l</options>	For executing system commands.	ghttp:contextPathEP <options>3</options>	consumer.	AMOP / camel-amap	Description	Salesforce / camel-salesforce		Testins	
ge / camel-core	Executes Languages scripts.	GHttp/camel-gae ohtto:contextPathEf <options>3</options>	Provides connectivity to the URL fetch service of Google App Engine but can also be used to receive	amqp:Equeue:(topic:3destinationNameEf <options>3</options>	For Messaging with the Advanced Message Queuing Protocol (AMQP).	salesforce:topicEf <options>l</options>	To integrate with Salesforce.	Testing	Description
uage://languageNameE:script3E? <options>3</options>		GLogin / camel-gae	messages from servlets. Used by Camel applications outside Google App Engine (GAE) for programmatic login to GAE	Esper / camel-esper in camel-extra esper:nameEf <options>1</options>	Working with the Esper Library for Event Stream	SAP NetWeaver / camel-sap-netweaver sap-netweaver:hostNameE:port3Ef <options>3</options>	To integrate with SAP NetWeaver Gateway.	DataSet / camel-core	For load and soak testing, th
r/camel-printer ://hostNameE:port]/printerPathEf <options>]</options>	Facilitates creation of printer endpoints to local, remote and wireless printers. The endpoints provide the ability to print camel directed payloads when utilized on camel routes.	glogin://hostNameE:portJEf <options>3</options>	Engine (GAE) for programmatic login to GAE applications.	JavaSpace / camel-javaspace	Processing.	Sap-neckeaver inustrianer pureativoperuns/a		dataset:nameEf <coptions>]</coptions>	For load and soak testing, th a way to create huge number sending to components or ass consumed correctly.
		GTask/camel-gae gtask://queueNameEf <options>I</options>	Supports asynchronous message processing on Google App Engine by using the task queueing	javaspace:jini://hostNameEf <options>3</options>	Sending and receiving messages through JavaSpace.	Remote Services		Mock / camel-core	
orties/camel-core perties://keyEf <options>3</options>	Facilitates using property placeholders directly in endpoint URI definitions.	gtask://queueNameEf <options>] GMail/camel-gae</options>	service as message queue.	JT/400 / camel-jt400	For integrating with data queues on an AS/400 (i.e., System i, IBM i, IS, etc.) systems.	Component / ArtifactId / URI	Description	mock:nameEf <options>I</options>	For testing routes and mediation
camel-core	Component for lookup of existing endpoints bound in the Registry.	gmail://user@gEoogleJmail.comEf <options>3</options>	Supports sending of emails via the mail service of Google App Engine.	jt400://user:pud@system/ <path_to_ dtaq>Ef<options>]</options></path_to_ 	System i, IBM i, i5, etc.) systems.	Avro / camel-avro	Working with Apache Auro for data serialization.	Stub/camel-core stub:someOtherCamelUriEf <options>3</options>	Allows you to stub out some p endpoint for easier testing or o
name	bound in the Registry.	Guava EventBus / camel-guava-eventbus	The Google Guava EventBus allows publish- subscribe style communication between	<pre>Kestrel/camel-kestrel kestrel://Eaddresslist/JqueueNameEf<options>3</options></pre>	For producing to or consuming from Kestrel gueues.	avro:Etransport3:EhostName3:Eport3E/ messageName3Ef <options>3</options>		Test / carnel-spring	
at		guava-eventbus:busNameEf <options>3</options>	components without requiring the components to explicitly register with one another.	MQTT / camel-mqtt	Component for communicating with MQ Telemetry Transport (MQTT) machine-to-machine (M2M)	Jolouds / camel-jolouds	For interacting with cloud compute & blobstore service via Jclouds.	test:expectedMessagesEndpointUriE? <options>3</options>	Creates a Mock endpoint which all the message bodies that or the given underlying endpoint.
Component / ArtifactId / URI	Description	HTTP		mqtt:nameEf <options>3</options>	Transport (MQTT) machine-to-machine (M2M) message brokers.	<pre>jclouds:<blobstore compute="">:Eprovider id3 Ef<options>3</options></blobstore></pre>		Web Services	
camel-irc :Elogin@lhostNameE:portl/#roomEf <options>l</options>	For Internet Relay Chat (IRC) communication.	Component / ArtifactId / URI	Description	SIP/camel-sip sip://user@hostNameE:port3Ef <options>3</options>	Publish/Subscribe communication capability using the Session Initiation Protocol (SIP) protocol.	<pre>JCIFS / camel-jcifs in camel-extra smb://userName@hostName/shareNameEf<options>1</options></pre>	This component provides access to remote file systems over the CIFS/SMB networking protocol.	Component / ArtifactId / URI	Descriptio
/ camel-xmpp		AHC/camel-ahc ahc:httpEs1://hostNameE:noct1E/cesourcellci1	To call external HTTP services using Async Http	SIPS / camet-sip	Publish/Subscribe communication capability using the secured Session Initiation Protocol (SIP)	RMI / camel-rmi	by using the JCIFS library.	CXF/camel-cxf cxf(\text{Span}\cxfEndpoint)//speeAddrexx>Ef\cotionx>1	Working with Apache CXF integration.
://Elogin@lhostnameE:portlE/participant]	Working with the Extensible Messaging and Presence Protocol (XMPP).	ahc:httpEs1://hostNameE:port3E/resourceUri3 Ef <options>3</options>	Chent	sips://user@hostNameE:portJEf <options>1</options>	using the secured Session Initiation Protocol (SIP) protocol.	rmi://hostNameE:port3Ef <options>3</options>	Working with Remote Method Invocation (RMI).	CXF Bean / camel-cxf	
		Cometd / camel-cometd cometd://hostName:port/ channelNameff <cptions>3</cptions>	HTTP-based event routing bus used to deliver messages using the Jetty Cometd implementation of the Bayeux Protocol.	SMPP/camel-smpp smpp://fusername@lhostNamef:portlf/coptions>l	To send and receive SMS using Short Messaging Service Center using the JSMPP library.	SSH component / camel-ssh	For sending commands to a SSH server.	cxfbean!serviceBeanRefEf <options>3</options>	Proceess the exchange using a annotated bean from the regis
sters			of the Bayeux Protocol.	SMPPS / camel-smpp		ssh:EusernameE:password3@3hostNameE:port3 Ef <options>3</options>	For sending community to a 33N server.	CXFRS/camel-cxf cxfrs: chean:rsEndpoint1//someAddress>Ef coptions>I	Working with Apache CXF for
Component / ArtifactId / URI ps / camel-jgroups in camel-extra	Description	HTTP / camel-http http://doi.or.il/pressurcellril	For calling out to external HTTP servers using Apache HTTP Client 3.x.	smpps://Eusername@3hostNameE:port3E? <options>3</options>	To send and receive secured SMS using Short Messaging Service Center using the JSMPP library.	Court Facilities		Restlet / camel-restlet	Comment for some
ps/camet-igroups in camet-extra oups:clusterNameEfoptions3	Provides exchange of messages between Camel infrastructure and JGroups clusters.	http:hostNameE:portNE/resourceUril Ef <options>1</options>	Apacne H11P Client 3.x.	Quickfix / camel-quickfix	Implementation of the QuickFix for Java engine which allows to send/receive FIX messages.	Search Engines		restlet:restletUrlEf <options>3</options>	Component for consuming and resources using Restlet.
eper / camel-zookeeper	Westernest Teatres strates	http4/camel-http4 http4/hostNemeE:port3E/resourceUri3	For calling out to external HTTP servers using Apache HTTP Client 4.x.	quickfix:configFileEf <options>3</options>	which allows to send/receive PIX messages.	Component / ArtifactId / URI ElasticSearch / camel-elasticsearch	Description	Spring Web Services / camel-spring-ws	Client-side support for acces and server-side support for
eeper!//zookeeperServerE!port3E/path3 options>3	Working with ZooKeeper clusters.	http%:hostNameE:port3E/resourceUri3 Ef <options>3</options>	Apache HTTP Client 4.x.	Networking		elasticsearch://clusterNameEf <options>l</options>	For interfacing with an ElasticSearch server.	spring-ws:Emapping-type:3someAddressEf <options>3</options>	and server-side support for contract-first web services Services.
ntent Repositories		Jetty/camel-jetty ietty:hostNameE:port3E/resourceUri3	For exposing services over HTTP,	Component / ArtifactId / URI	Description	Lucene / camel-lucene	Uses Apache Lucene to perform Java-based indexing and full text based searches using advanced analysis/tokenization capabilities.	Websocket / camel-websocket	Communicating with Websecke
Component / Artifactid / URI	Description	jetty:hostNameE:port3E/resourceUri3 Ef <options>3</options>		DNS/camel-dns dns:operationEf <options>3</options>	To lookup domain information and run Domain Name System (DNS) queries using DNSJava.	luceme:searcherName: <insert query>Ef<options>I</options></insert query>		websocket://hostNameE:port3E/resourceUri3 Ef <options>3</options>	Communicating with Websecki
/ camel-cmis	Uses the Apache Chemistry client API to interface with Content Management	Serviet/camel-serviet serviet/relativePathEf <options>1</options>	For exposing services over HTTP through the Servicet which is deployed into the Web container.	HL7 / camel-hl7	For working with the HL7 MLLP protocol and the HL7 model using the HAPI library.	Solr://hostNameE:port3/solrEf <options>3</options>	Uses the Solrj client API to interface with an Apache Lucene Solr server.	XML	
s://cmisServerUrlEf <options>1</options>	Interoperability Services (CMIS).		and appropriate the contraction.	mina2:tcp://hostNameE:port3Ef <options>3</options>				Component / ArtifactId / URI	Descriptio
camel-jcr ://user:password@repository/path/to/	Storing a message in a Java Content Repository (JCR) compliant repository like Apache	Java Message Service		MINA / camel-mina	Working with Apache Multipurpose Infrastructure for Network Applications (NINA) 1.x. Transmission Control Protocol (TCP), User Datagram Pretocol (UDP) and Virtual Machine (VM) protocol are	Security		Bean Validation / camel-bean-validator bean-validator:somethingEf <options>3</options>	Validates the payload of a mes Validation API (JSR 303). Hib
//user:password@repository/path/to/ Ef <options>3</options>	Jackrabbit.	Gomponent / ArtifactId / URI ActiveMQ / activemp-camel in ore apache activemp	Description	mina: <tcp!udp!vm>:hostNameE:port3Ef<options>3</options></tcp!udp!vm>	Control Protocol (TCP), User Datagram Protocol (UDP) and Virtual Machine (VM) protocol are	Component / Artifactid / URI	Description	FOP/camel-fop	
dpoint Communications		activemniftonic IdentinationName	For JMS Messaging with Apache ActiveMQ.	MINA2 / camel-mina2	Working with Apache MINA 2.x. Transmission	Crypto (Digital Signatures) / camel-crypto	Used to sign and verify exchanges using the Signature Service of the Java Cryptographic	fop:outputFormatEf <options>3</options>	Renders the message into diffe using Formatting Objects Proc is driven by XSL formatting obj
Component / ArtifactId / URI	Description	ActiveHQ Journal / activemq-core	Uses ActiveM0's fast disk journaling implementation to store message bodies in a rolling log file.	MINA2/camet-mina2 mina2: <tcp!udp!vm>:hostNameE:port3Ef<options>3</options></tcp!udp!vm>	Working with Apache MINA 2.x. Transmission Control Protocol (TCP), User Datagram Protocol (UDP) and Virtual Machine (VM) protocol are	crypto: <sign verify>:nameEf<options>3</options></sign verify>	Extension.	MSV/camel-msv msv:somelocalOrRemoteResourceEf <options>1</options>	Validates the payload of a mess Library.
/camel-core ct:someNameEf <options>1</options>	Synchronous call to another endpoint from same CarnelContext.	activemq.journal:directoryNameEf <options>l</options>	rolling log file.	Netty / camel-netty	supported.	XML Security / camel-xmlsecurity	Used to sign and verify exchanges using the XML signature specification.	msv:someLocalOrRemoteResourceEf <options>I RNC/camel-jing</options>	Livery.
VM / camel-core	Synchronous call to another endpoint in another	JMS/camel-jms jms:Equeue:!topic:3 destinationNamef/coptions>3	Working with JMS provider.	netty/ <tcp!udp>//hostNameE:port3Ef<options>3</options></tcp!udp>	Working with TCP and UDP protocols using Java NIO based capabilities offered by the Netty project.	xmlsecurity: <sign(verify>:nameEf<options>3</options></sign(verify>	signature specification.	rnc:/relativeOrAbsoluteUriEf <options>3</options>	vaugates the payload of a meso Compact Syntax.
ct-vm:someNameEf <options>3</options>	CamelCentext running in the same Java virtual machine (JVM).			Netty HTTP / camel-netty-http		Cosial Madia		RNG / camel-jing	Validates the payload of a mess
tor / camel-disruptor	Provides asynchronous SEDA behavior much as the standard SEDA Component, but utilizes a Disruptor instead of a BlockingQueue.	RabbitMQ/camel-rabbitmq rabbitmq://hostNameE:port3/ exchangeNameEfCoptions>3	For JMS Messaging with RabbitMQ.	netty-http:http:Eport3/contextPathEf <options>3</options>	Netty HTTP server and client using the Netty project.	Social Media	Description	rng:/relativeOrAbsoluteUriEf <options>] StAX/camel-stax</options>	
uptor:someNameEf <option>3</option>	Disruptor instead of a BlockingQueue.	exchangeNameEf <options>3</options>		OSGi		Component / Artifactid / URI Facebook / camel-facebook	Description	Stax:(contentHandlerClassName(#myHandler)	Process messages through a ! (SAX) ContentHandler.
ptor VM / camel-disruptor	Same as Disruptor, but the buffers of the Disrupter VM endpoints also provide support for communication across CamelContexts instances so you can use this mechanism to	SJMS / camel-s/ms	From the ground upwards implementation of a	Component / Artifactld / HRI	Description	Facebook/camel-facebook facebook://endpointEf <options>3</options>	Providing access to all of the Facebook APIs accessible using Facebook4J.	XQuery / camel-saxon	Generates a response using an
ruptor-vm:someNameE? <option>3</option>	instances so you can use this mechanism to communicate across web applications.	sjms:Equeue: topic:ldestinationNameEf <options>l</options>		EventAdmin / camel-eventadmin	Description	Twitter / camel-twitter		xquery:someX@ueryResource	verm aces a response using an
/ camel-core	Asynchronous call to another endpoint in the same Camel Context; staged event-driven	Stomp/camel-stomp stomp:queue:destinationNameEf <options>1</options>	For communicating with Stomp compliant message brokers, like Apache ActiveMQ or ActiveMQ Apollo.	eventadmin:topicEf <options>3</options>	Receiving OSGi EventAdmin events.	Twitter/camed-twitter twitter://endpointE? <options>1</options>	Enables the most useful features of the Twitter API by encapsulating Twitter4J.	XSLT/camel-core xslt:templateNameEf <options>3</options>	Generates a response using a E Language Transformations IXS
			ActivaMO Apollo						
:someNameEf <options>3</options>	same Carnet Context; staged event-driven architecture (SEDA). Asynchronous call to another endpoint in the same JVM.	ZeroMQ / camel-zeromg in camel-extra.	The state of the s	Pax Logging / camel-paxlogging	Receiving Pax-Logging events in OSGI.	Yammer / camel-yammer	Allows you to interact with the Yammer enterprise social network.	Validation / camel-core	Validates the payload of a m Schema and Java API for XML

Supported data formats

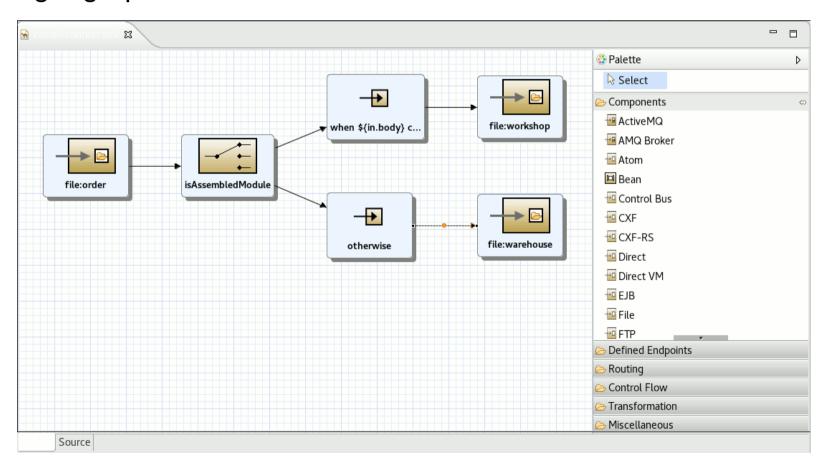
- Current 40 supported formats
 JVM object marshalling (Serialisation)
 object marshalling (JSON, Protobuf, ...)
 object/XML marshalling (JAXB, XmlBeans, ...)
 object/XML/webservice (SOAP)
 flat-data marshalling (CSV, EDI, FIX, ...)
 domain specific marshalling (HL7)
 compression (Gzip, ZIP, LZF)
 security (JCE, PGP, XMLSecurity)
 miscellaneous (Base64, MIME, Barcode, custom data format, ...)
- complete list: http://camel.apache.org/data-format.html

Deployment model

- Strategy
 - no dependency to the container
- Options
 - standalone (Java SE application)
 - Spring (Spring Boot)
 - WAR (web container: Tomcat, Jetty, ...)
 - JEE (application server: Glassfish, JBoss AS, Oracle Weblogic, ...)
 - OSGi (Apache Karaf Container, Eclipse Equinox)
 - Cloud (Google App Engine)

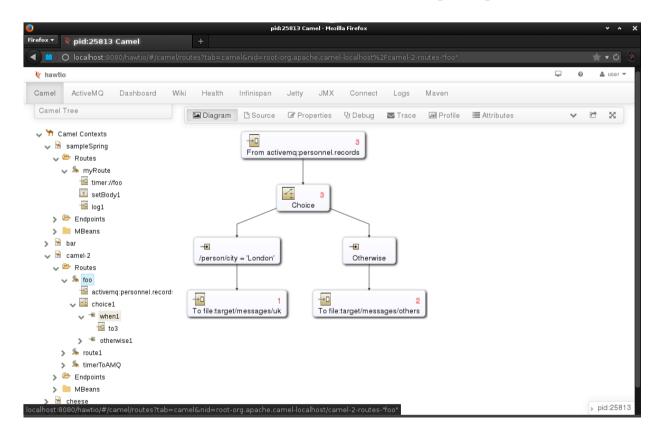
Tools

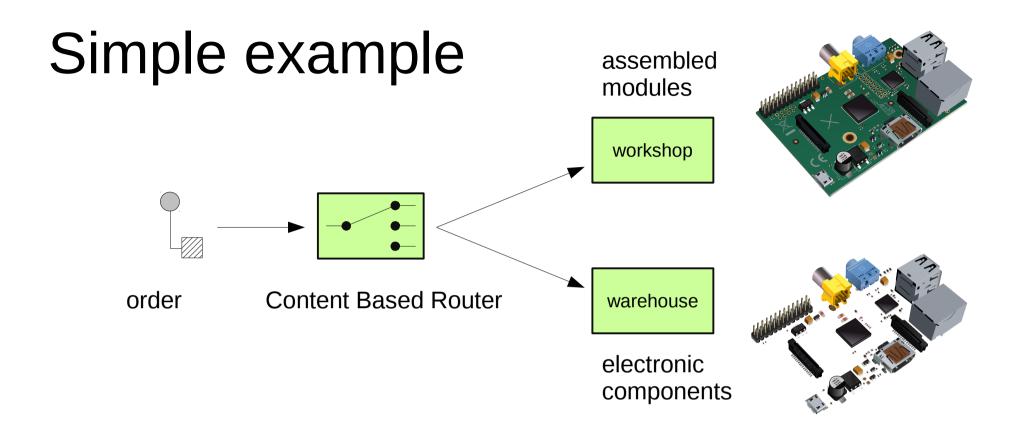
JBoss Tools for Apache Camel - an open source set of Eclipse plugins for creating Apache Camel projects, editing Camel routes using a graphical editor



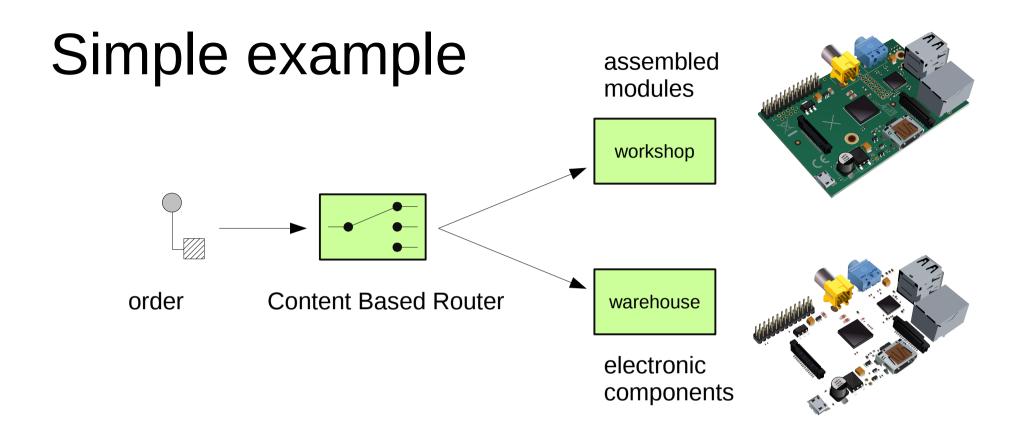
Tools

Hawtio - an open source HTML5 web application for visualizing, starting/stopping and tracing Apache Camel routes, browsing endpoints, sending messages to endpoints as well as browsing and sending to ActiveMQ destinations, viewing logs and metric charting





in human language from **order** choice when **isAssembledModule** to **workshop** otherwise to **warehouse**



```
# in Java DSL
from(order)
    .choice()
    .when(isAssembledModule).to(workshop)
    .otherwise().to(warehouse)
```

Appendix

User guides

http://camel.apache.org/user-guide.html http://karaf.apache.org/documentation.html

- Enterprise Integration Pattern
 http://www.enterpriseintegrationpatterns.com/patterns/messaging/
- Wildfly + Camel integration
 https://github.com/wildfly-extras/wildfly-camel
- Blogs

http://www.davsclaus.com/search/label/apache%20camelhttp://blog.christianposta.com/tags/#camel