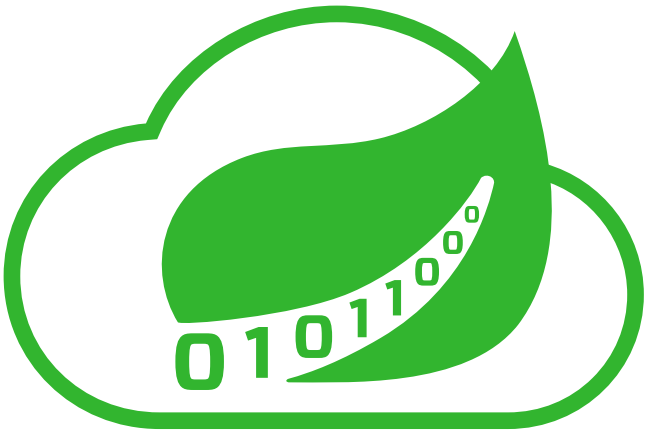

Spring Cloud Stream App Starters Reference Guide

Einstein.RELEASE

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Part I. Reference Guide

This section will provide you with a detailed overview of Spring Cloud Stream Application Starters, their purpose, and how to use them. It assumes familiarity with general Spring Cloud Stream concepts, which can be found in the Spring Cloud Stream reference documentation.

1. Introduction

Spring Cloud Stream Application Starters provide you with out-of-the-box Spring Cloud Stream uility applications that you can run independently or with Spring Cloud Data Flow. You can also use the starters as a basis for creating your own applications.

They include:

- connectors (sources, processors, and sinks) for a variety of middleware technologies including message brokers, storage (relational, non-relational, filesystem);
- adapters for various network protocols;
- generic processors that can be customized via Spring Expression Language (SpEL) or scripting.

You can find a detailed listing of all the starters and as their options in the corresponding section of this guide.

You can find all available app starter repositories in this GitHub Organization.

1.1 Pre-built applications

As a user of Spring Cloud Stream Application Starters you have access to two types of artifacts.

Starters are libraries that contain the complete configuration of a Spring Cloud Stream application with a specific role (e.g. an *HTTP source* that receives HTTP POST requests and forwards the data on its output channel to downstream Spring Cloud Stream applications). Starters are *not* executable applications, and are intended to be included in other Spring Boot applications, along with an available Binder implementation of your choice.

Out-of-the-box applications are Spring Boot applications that include the starters and a Binder implementation - a fully functional uber-jar. These uber-jar's include minimal code required to execute standalone. For each starter application, the project provides a prebuilt version for Apache Kafka and Rabbit MQ Binders.

Note

Only starters are present in the source code of the project. Prebuilt applications are generated according to the stream apps generator maven plugin.

1.2 Classification

Based on their target application type, starters can be either:

- a *source* that connects to an external resource to poll and receive data that is published to the default "output" channel;
- a *processor* that receives data from an "input" channel and processes it, sending the result on the default "output" channel;
- a *sink* that connects to an external resource to send the received data to the default "input" channel.

You can easily identify the type and functionality of a starter based on its name. All starters are named following the convention `spring-cloud-starter-stream-<type>-<functionality>`.

For example `spring-cloud-starter-stream-source-file` is a starter for a *file source* that polls a directory and sends file data on the output channel (read the reference documentation of the source for details). Conversely, `spring-cloud-starter-stream-sink-cassandra` is a starter for a *Cassandra sink* that writes the data that it receives on the input channel to Cassandra (read the reference documentation of the sink for details).

The prebuilt applications follow a naming convention too: `<functionality>-<type>-<binder>`. For example, `cassandra-sink-kafka-10` is a *Cassandra sink* using the Kafka binder that is running with Kafka version 0.10.

1.3 Using the Artifacts

You either get access to the artifacts produced by Spring Cloud Stream Application Starters via Maven, Docker, or building the artifacts yourself.

Maven and Docker access

Starters are available as Maven artifacts in the Spring repositories. You can add them as dependencies to your application, as follows:

```
<dependency>
  <groupId>org.springframework.cloud.stream.app</groupId>
  <artifactId>spring-cloud-starter-stream-sink-cassandra</artifactId>
  <version>2.1.0.BUILD-SNAPSHOT</version>
</dependency>
```

From this, you can infer the coordinates for other starters found in this guide. While the version may vary, the group will always remain `org.springframework.cloud.stream.app` and the artifact id follows the naming convention `spring-cloud-starter-stream-<type>-<functionality>` described previously.

Prebuilt applications are available as Maven artifacts too. It is not encouraged to use them directly as dependencies, as starters should be used instead. Following the typical Maven `<group>:<artifactId>:<version>` convention, they can be referenced for example as:

```
org.springframework.cloud.stream.app:cassandra-sink-rabbit:2.1.0.BUILD-SNAPSHOT
```

You can download the executable jar artifacts from the Spring Maven repositories. The root directory of the Maven repository that hosts release versions is repo.spring.io/release/org/springframework/cloud/stream/app/. From there you can navigate to the latest release version of a specific app, for example log-sink-rabbit-2.0.2.RELEASE.jar. Use the Milestone and Snapshot repository locations for Milestone and Snapshot executable jar artifacts.

The Docker versions of the applications are available in Docker Hub, at `hub.docker.com/r/springcloudstream/`. Naming and versioning follows the same general conventions as Maven, e.g.

```
docker pull springcloudstream/cassandra-sink-kafka
```

will pull the *latest* Docker image of the *Cassandra sink* with the Kafka binder.

Building the Artifacts

You can build the project and generate the artifacts (including the prebuilt applications) on your own. This is useful if you want to deploy the artifacts locally or add additional features.

First, you need to generate the prebuilt applications. This is done by running the application generation Maven plugin. You can do so by simply invoking the maven build with the generateApps profile and install lifecycle.

```
mvn clean install -PgenerateApps
```

Each of the prebuilt applciation will contain:

- `pom.xml` file with the required dependencies (starter and binder)
- a class that contains the `main` method of the application and imports the predefined configuration
- generated integration test code that validates the component against the configured binder.

For example, `spring-cloud-starter-stream-sink-cassandra` will generate `cassandra-sink-rabbit` and `cassandra-sink-kafka` as completely functional applications.

1.4 Custom Artifacts

Apart from accessing the sources, sinks and processors already provided by the project, in this section we will describe how to:

- Use a different binder than Kafka or Rabbit
- Create your own applications
- Customize dependencies such as Hadoop distributions or JDBC drivers

Using a different binder

Prebuilt applications are provided for both kafka and rabbit binders. But if you want to connect to a different middleware system, and you have a binder for it, you will need to create new artifacts.

```
<dependencies>
  <!- other dependencies -->
  <dependency>
    <groupId>org.springframework.cloud.stream.app</groupId>
    <artifactId>spring-cloud-starter-stream-sink-cassandra</artifactId>
    <version>2.1.0.BUILD-SNAPSHOT</version>
  </dependency>
  <dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-stream-binder-kinesis</artifactId>
    <version>1.0.0.BUILD-SNAPSHOT</version>
  </dependency>
</dependencies>
```

The next step is to create the project's main class and import the configuration provided by the starter.

```
package org.springframework.cloud.stream.app.cassandra.sink.rabbit;

import org.springframework.boot.SpringApplication;
import org.springframework.boot.autoconfigure.SpringBootApplication;
import org.springframework.cloud.stream.app.cassandra.sink.CassandraSinkConfiguration;
import org.springframework.context.annotation.Import;


@SpringBootApplication
@Import(CassandraSinkConfiguration.class)
public class CassandraSinkKinesisApplication {
```

```
 public static void main(String[] args) {
  SpringApplication.run(CassandraSinkKinesisApplication.class, args);
 }
}
```

New Applications

Spring Cloud Stream Application Starters consists of regular Spring Boot applications with some additional conventions that facilitate generating prebuilt applications with the preconfigured binders. Sometimes, your solution may require additional applications that are not in the scope of out-of-the-box Spring Cloud Stream Application Starters, or require additional tweaks and enhancements. In this section we will show you how to create custom applications that can be part of your solution, along with Spring Cloud Stream application starters. You have the following options:

- create new Spring Cloud Stream applications;
- use the starters to create customized versions;

Generic Applications

If you want to add your own custom applications to your solution, you can simply create a new Spring Cloud Stream app project with the binder of your choice and run it the same way as the applications provided by Spring Cloud Stream Application Starters, independently or via Spring Cloud Data Flow. The process is described in the Quick Start section of Spring Cloud Stream.

In a nutshell, you can go to the Spring Initializr and choose a Spring Cloud Stream Binder of your choice. This way you already have the necessary infrastructure ready to go and mainly focus on the specifics of the application.

The following requirements need to be followed when you go with this option:

- a single inbound channel named `output` for sources - the simplest way to do so is by using the predefined interface `org.spring.cloud.stream.messaging.Source`;
- a single outbound channel named `input` for sinks - the simplest way to do so is by using the predefined interface `org.spring.cloud.stream.messaging.Sink`;
- both an inbound channel named `input` and an outbound channel named `output` for processors - the simplest way to do so is by using the predefined interface `org.spring.cloud.stream.messaging.Processor`.

Customize Starter Applications

You can also reuse the starters provided by Spring Cloud Stream Application Starters to create custom components, enriching the behavior of the application. For example, you can add a Spring Security layer to your *HTTP source*, add additional configurations to the `ObjectMapper` used for JSON transformation wherever that happens, or change the JDBC driver or Hadoop distribution that the application is using. In order to do this, you should set up your project following a process similar to customizing a binder. In fact, customizing the binder is the simplest form of creating a custom component.

As a reminder, this involves:

- adding the starter to your project

- choosing the binder
- adding the main class and importing the starter configuration.

After doing so, you can add the additional configuration for the extra features of your application.

1.5 Patching Pre-built Applications

If you're looking to patch the pre-built applications to accommodate the addition of new dependencies, you can use the following example as the reference. Let's review the steps to add `mysql` driver to `jdbc-sink` application.

- Go to: start-scs.cfapps.io/
- Select the application and binder dependencies [`*JDBC sink*` *and* `*Rabbit binder starter*`]
- Generate and load the project in an IDE
- Add `mysql` java-driver dependency

```
<dependencies>
  <dependency>
    <groupId>mysql</groupId>
    <artifactId>mysql-connector-java</artifactId>
    <version>5.1.37</version>
  </dependency>
  <dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-stream-binder-rabbit</artifactId>
  </dependency>
  <dependency>
    <groupId>org.springframework.cloud.stream.app</groupId>
    <artifactId>spring-cloud-starter-stream-sink-jdbc</artifactId>
  </dependency>
  <dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-test</artifactId>
    <scope>test</scope>
  </dependency>
</dependencies>
```

- Import the respective configuration *class* to the generated Spring Boot application. In the case of `jdbc` sink, it is: `@Import(org.springframework.cloud.stream.app.jdbc.sink.JdbcSinkConfiguration.class)`. You can find the configuration *class* for other applications in their respective repositories.

```
@SpringBootApplication
@Import(org.springframework.cloud.stream.app.jdbc.sink.JdbcSinkConfiguration.class)
public class DemoApplication {

  public static void main(String[] args) {
    SpringApplication.run(DemoApplication.class, args);
  }
}
```

- Build and install the application to desired maven repository
- The patched copy of `jdbc-sink` application now includes `mysql` driver in it
- This application can be run as a standalone *uberjar*

1.6 Creating New Stream Application Starters and Generating Artifacts

In this section, we will explain how to develop a custom source/sink/processor application and then generate maven and docker artifacts for it with the necessary middleware bindings using the existing tooling provided by the spring cloud stream app starter infrastructure. For explanation purposes, we will assume that we are creating a new source application for a technology named foobar.

- Create a repository called foobar in your local github account
- The root artifact (something like foobar-app-starters-build) must inherit from `app-starters-build`

Please follow the instructions above for designing a proper Spring Cloud Stream Source. You may also look into the existing starters for how to structure a new one. The default naming for the main `@Configuration` class is `FoobarSourceConfiguration` and the default package for this `@Configuration` is `org.springfamework.cloud.stream.app.foobar.source`. If you have a different class/package name, see below for overriding that in the app generator. The technology/functionality name for which you create a starter can be a hyphenated stream of strings such as in `scriptable-transform` which is a processor type in the module `spring-cloud-starter-stream-processor-scriptable-transform`.

The starters in `spring-cloud-stream-app-starters` are slightly different from the other starters in spring-boot and spring-cloud in that here we don't provide a way to auto configure any configuration through spring factories mechanism. Rather, we delegate this responsibility to the maven plugin that is generating the binder based apps. Therefore, you don't have to provide a `spring.factories` file that lists all your configuration classes.

- The starter module needs to inherit from the parent (`foobar-app-starters-build`)
- Add the new foobar source module to the root pom of the new repository
- In the pom.xml for the source module, add the following in the `build` section. This will add the necessary plugin configuration for app generation as well as generating proper documentation metadata. Please ensure that your root pom inherits app-starters-build as the base configuration for the plugins is specified there.

```
<build>
  <plugins>
   <plugin>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-app-starter-doc-maven-plugin</artifactId>
   </plugin>
   <plugin>
    <groupId>org.springframework.cloud.stream.app.plugin</groupId>
    <artifactId>spring-cloud-stream-app-maven-plugin</artifactId>
    <configuration>
     <generatedProjectHome>${session.executionRootDirectory}/apps</generatedProjectHome>
     <generatedProjectVersion>${project.version}</generatedProjectVersion>
     <bom>
      <name>scs-bom</name>
      <groupId>org.springframework.cloud.stream.app</groupId>
      <artifactId>foobar-app-dependencies</artifactId>
      <version>${project.version}</version>
     </bom>
     <generatedApps>
      <foobar-source/>
     </generatedApps>
    </configuration>
   </plugin>
```

```
  </plugins>
 </build>
```

More information about the maven plugin used above to generate the apps can be found here: github.com/spring-cloud/spring-cloud-stream-app-maven-plugin

If you did not follow the default convention expected by the plugin for where it is looking for the main configuration class, which is `org.springfamework.cloud.stream.app.foobar.source.FoobarSourceConfiguration`, you can override that in the configuration for the plugin. For example, if your main configuration class is `foo.bar.SpecialFooBarConfiguration.class`, this is how you can tell the plugin to override the default.

```
<foobar-source>
    <autoConfigClass>foo.bar.SpecialFooBarConfiguration.class</autoConfigClass>
</foobar-source>
```

- Create a new module to manage dependencies for foobar (`foobar-app-dependencies`). This is the bom (bill of material) for this project. It is advised that this bom is inherited from `spring-cloud-dependencies-parent`. Please see other starter repositories for guidelines.
- You need to add the new starter dependency to the BOM in the dependency management section. For example,

```
<dependencyManagement>
...
...
    <dependency>
        <groupId>org.springframework.cloud.stream.app</groupId>
        <artifactId>spring-cloud-starter-stream-source-foobar</artifactId>
        <version>1.0.0.BUILD-SNAPSHOT</version>
    </dependency>
...
...
```

- At the root of the repository build, install and generate the apps:

```
./mvnw clean install -PgenerateApps
```

This will generate the binder based foobar source apps in a directory named `apps` at the root of the repository. If you want to change the location where the apps are generated, for instance `/tmp/scst-apps`, you can do it in the configuration section of the plugin.

```
<configuration>
    ...
    <generatedProjectHome>/tmp/scst-apps</generatedProjectHome>
    ...
</configuration
```

By default, we generate apps for both Kafka and Rabbitmq binders - `spring-cloud-stream-binder-kafka` and `spring-cloud-stream-binder-rabbit`. Say, if you have a custom binder you created for some middleware (E.g. JMS), which you need to generate apps for foobar source, you can add that binder to the binders list in the configuration section as in the following.

```
<binders>
    <jms />
</binders>
```

Please note that this will only work, as long as there is a binder with the maven coordinates of `org.springframework.cloud.stream` as group id and `spring-cloud-stream-binder-jms`

as artifact id. This artifact needs to be specified in the BOM above and available through a maven repository as well.

If you have an artifact that is only available through a private internal maven repository (may be an enterprise wide Nexus repo that you use globally across teams), and you need that for your app, you can define that as part of the maven plugin configuration.

For example,

```
<configuration>
...
    <extraRepositories>
        <repository>
            <id>private-internal-nexus</id>
            <url>.../</url>
            <name>...</name>
            <snapshotEnabled>...</snapshotEnabled>
        </repository>
    </extraRepositories>
</configuration>
```

Then you can define this as part of your app tag:

```
<foobar-source>
    <extraRepositories>
        <private-internal-nexus />
    </extraRepositories>
</foobar-source>
```

- cd into the directory where you generated the apps (`apps` at the root of the repository by default, unless you changed it elsewhere as described above).

Here you will see `foobar-source-kafka` and `foobar-source-rabbit`. If you added more binders as described above, apps will be generated for them as well - e.g. foobar-source-jms.

You can import these apps directly into your IDE of choice if you further want to do any customizations on them. Each of them is a self contained spring boot application project. For the generated apps, the parent is `spring-boot-starter-parent` as required by the underlying Spring Initializr library.

You can cd into these custom foobar-source directories and do the following to build the apps:

```
cd foo-source-kafka
```

```
mvn clean install
```

This installs the foo-source-kafka into your local maven cache (~/.m2 by default).

The app generation phase adds an integration test to the app project that is making sure that all the spring components and contexts are loaded properly. However, these tests are not run by default when you do a `mvn install`. You can force the running of these tests by doing the following:

```
mvn clean install -DskipTests=false
```

One important note about running these tests in generated apps:

If your application's spring beans need to interact with some real services out there or expect some properties to be present in the context, these tests will fail unless you make those things available. An example would be a Twitter Source, where the underlying spring beans are

trying to create a twitter template and will fail if it can't find the credentials available through properties. One way to solve this and still run the generated context load tests would be to create a mock class that provides these properties or mock beans (for example, a mock twitter template) and tell the maven plugin about its existence. You can use the existing module `app-starters-test-support` for this purpose and add the mock class there. See the class `org.springframework.cloud.stream.app.test.twitter.TwitterTestConfiguration` for reference. You can create a similar class for your foobar source - `FoobarTestConfiguration` and add that to the plugin configuration. You only need to do this if you run into this particular issue of Spring beans are not created properly in the integration test in the generated apps.

```
<foobar-source>

  <extraTestConfigClass>org.springframework.cloud.stream.app.test.foobar.FoobarTestConfiguration.class</
extraTestConfigClass>
</foobar-source>
```

When you do the above, this test configuration will automatically be imported into the context of your test class.

Also note that, you need to regenerate the apps each time you make a configuration change in the plugin.

- Now that you built the applications, they are available under the `target` directories of the respective apps and also as maven artifacts in your local maven repository. Go to the `target` directory and run the following:

`java -jar foobar-source-kafa.jar` [Ensure that you have Apache Kafka running locally when you do this]

It should start the application up.

- The generated apps also support the creation of docker images. You can cd into one of the foobar-source* app and do the following:

```
mvn clean package docker:build
```

This creates the docker image under the `target/docker/springcloudstream` directory. Please ensure that the Docker container is up and running when executing the above Docker command.

All the generated apps from the various app repositories are uploaded to Docker Hub

However, for a custom app that you build, this won't be uploaded to docker hub under `springcloudstream` repository. If you think that there is a general need for this app, you should try contributing this starter as a new repository to Spring Cloud Stream App Starters. Upon review, this app then can be eventually available through the above location in docker hub.

If you still need to push this to docker hub under a different repository (may be an enterprise repo that you manage for your organization) you can take the following steps.

Go to the pom.xml of the generated app [example - `foo-source-kafka/pom.xml`] Search for `springcloudstream`. Replace with your repository name.

Then do this:

```
mvn clean package docker:build docker:push -Ddocker.username=[provide your
username] -Ddocker.password=[provide password]
```

This will upload the docker image to the docker hub in your custom repository.

1.7 General FAQ on Spring Cloud Stream App Starters

In the following sections, you can find a brief FAQ on various things that we discussed above and a few other infrastructure related topics.

1. What are Spring Cloud Stream Application Starters?
   Spring Cloud Stream Application Starters are Spring Boot based Spring Integration applications that provide integration with external systems. GitHub: github.com/spring-cloud-stream-app-starters
   Project page: cloud.spring.io/spring-cloud-stream-app-starters/

2. What is the parent for stream app starters?
   The parent for all app starters is `app-starters-build` which is coming from the core project. github.com/spring-cloud-stream-app-starters/core For example:

```
<parent>
    <groupId>org.springframework.cloud.stream.app</groupId>
    <artifactId>app-starters-build</artifactId>
    <version>2.1.0.RELEASE</version>
    <relativePath/>
</parent>
```

3. Why is there a BOM in the core proejct?
   Core defines a BOM which contains all the dependency management for common artifacts. This BOM is named as `app-starters-core-dependencies`. We need this bom during app generation to pull down all the core dependencies.

4. What are the contents of the core BOM?
   In addition to the common artifacts in core, the app-starters-core-dependencies BOM also adds dependency management for spring-cloud-dependencies which will include spring-cloud-stream transitively.

5. Where is the core BOM used?
   There are two places where the core BOM is used. It is used to provide compile time dependency management for all the starters. This is defined in the `app-starters-build` artfiact. This same BOM is referenced through the maven plugin configuration for the app generation. The generated apps thus will include this bom also in their pom.xml files.

6. What spring cloud stream artifacts does the parent artifact (`app-starters-build`) include?

   - spring-cloud-stream
   - Spring-cloud-stream-test-support-internal
   - spring-cloud-stream-test-support

7. What other artfiacts are available through the parent `app-starters-build` and where are they coming from?
   In addition to the above artifacts, the artifacts below also included in `app-starters-build` by default.

   - json-path
   - spring-integration-xml

- spring-boot-starter-logging
- spring boot-starter-security
  Spring-cloud-build is the parent for app-starters-build. Spring-cloud-build imports spring-boot-dependencies and that is from where these artifacts are coming from.

8. I did not see any other Spring Integration components used in the above 2 lists. Where are those dependencies coming from for individual starters?
   Spring-integration bom is imported in the spring-boot-dependencies bom and this is where the default SI dependencies are coming for SCSt app starters.

9. Can you summarize all the BOM's that SCSt app starters depend on?
   All SCSt app starters have access to dependencies defined in the following BOM's and other dependencies from any other BOM's these three boms import transitively as in the case of Spring Integration:
   - app-starters-core-dependencies
   - spring-cloud-dependencies
   - spring-boot-dependencies

10. Each app starter has `app-starter-build` as the parent which in turn has `spring-cloud-build` as parent. The above documentation states that the generated apps have `spring-boot-starter` as the parent. Why the mismatch?
    There is no mismatch per se, but a slight subtlety. As the question frames, each app starter has access to artifacts managed all the way through `spring-cloud-build` at compile time. However, this is not the case for the generated apps at runtime. Generated apps are managed by boot. Their parent is `spring-boot-starter` that imports `spring-boot-dependencies` bom that includes a majority of the components that these apps need. The additional dependencies that the generated application needs are managed by including a BOM specific to each application starter.

11. Why is there an app starter specific BOM in each app starer repositories? For example, `time-app-dependencies`.
    This is an important BOM. At runtime, the generated apps get the versions used in their dependencies through a BOM that is managing the dependencies. Since all the boms that we specified above only for the helper artifacts, we need a place to manage the starters themselves. This is where the app specific BOM comes into play. In addition to this need, as it becomes clear below, there are other uses for this BOM such as dependency overrides etc. But in a nutshell, all the starter dependencies go to this BOM. For instance, take TCP repo as an example. It has a starter for source, sink, client processor etc. All these dependencies are managed through the app specific `tcp-app-dependencies` bom. This bom is provided to the app generator maven plugin in addition to the core bom. This app specific bom has `spring-cloud-dependencies-parent` as parent.

12. How do I create a new app starter project?
    If you have a general purpose starter that can be provided as an of of the box app, create an issue for that in app-starters-release. If there is a consensus, then a repository can be created in the `spring-cloud-stream-app-starters` organization where you can start contributing the starters and other components.

13. I created a new starter according to the guidelines above, now how do I generate binder specific apps for the new starters?

By default, the app-starters-build in core is configured with the common configuration needed for the app generator maven plugin. It is configured for generating apps for kafka-09, kafka-10 and rabbitmq binders. In your starter you already have the configuration specified for the plugin from the parent. Modify the configuration for your starter accordingly. Refer to an existing starter for guidelines. Here is an example of modifying such a configuration : github.com/spring-cloud-stream-app-starters/time/blob/master/spring-cloud-starter-stream-source-time/pom.xml Look for spring-cloud-stream-app-maven-plugin in the plugins section under build. You generate binder based apps using the generateApps maven profile. You need the maven install lifecycle to generate the apps.

14. How do I override Spring Integration version that is coming from spring-boot-dependencies by default?

    The following solution only works if the versions you want to override are available through a new Spring Integration BOM. Go to your app starter specific bom. Override the property as following:

```
<spring-integration.version>VERSION GOES HERE</spring-integration.version>
```

```
Then add the following in the dependencies management section in the BOM.
```

```
 <dependency>
 <groupId>org.springframework.integration</groupId>
 <artifactId>spring-integration-bom</artifactId>
 <version>${spring-integration.version}</version>
 <scope>import</scope>
 <type>pom</type>
</dependency>
```

15. How do I override spring-cloud-stream artifacts coming by default in spring-cloud-dependencies defined in core BOM?

    The following solution only works if the versions you want to override are available through a new Spring-Cloud-Dependencies BOM. Go to your app starter specific bom. Override the property as following:

```
<spring-cloud-dependencies.version>VERSION GOES HERE</spring-cloud-dependencies.version>
```

```
Then add the following in the dependencies management section in the BOM.
```

```
<dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-dependencies</artifactId>
    <version>${spring-cloud-dependencies.version}</version>
    <scope>import</scope>
    <type>pom</type>
</dependency>
```

16. What if there is no spring-cloud-dependencies BOM available that contains my versions of spring-cloud-stream, but there is a spring-cloud-stream BOM available?

    Go to your app starter specific BOM. Override the property as below.

```
<spring-cloud-stream.version>VERSION GOES HERE</spring-cloud-stream.version>
```

```
Then add the following in the dependencies management section in the BOM.
```

```
<dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-stream-dependencies</artifactId>
    <version>${spring-cloud-stream.version}</version>
    <scope>import</scope>
    <type>pom</type>
</dependency>
```

17. What if I want to override a single artifact that is provided through a bom? For example spring-integration-java-dsl?

    Go to your app starter BOM and add the following property with the version you want to override:

```
<spring-integration-java-dsl.version>VERSION GOES HERE</spring-integration-java-dsl.version>
```

```
Then in the dependency management section add the following:
```

```
<dependency>
    <groupId>org.springframework.integration</groupId>
    <artifactId>spring-integration-java-dsl</artifactId>
    <version>${spring-integration-java-dsl.version}</version>
</dependency>
```

18. How do I override the boot version used in a particular app?

    When you generate the app, override the boot version as follows.

```
./mvnw clean install -PgenerateApps -DbootVersion=<boot version to override>
```

```
For example: ./mvnw clean install -PgenerateApps -DbootVersion=2.0.0.BUILD-SNAPSHOT
```

You can also override the boot version more permanently by overriding the following property in your starter pom.

```
<bootVersion>2.0.0.BUILD-SNAPSHOT</bootVersion>
```

Part II. Starters

2. Sources

2.1 File Source

This application polls a directory and sends new files or their contents to the output channel. The file source provides the contents of a File as a byte array by default. However, this can be customized using the `--mode` option:

- **ref** Provides a `java.io.File` reference
- **lines** Will split files line-by-line and emit a new message for each line
- **contents** The default. Provides the contents of a file as a byte array

When using `--mode=lines`, you can also provide the additional option `--withMarkers=true`. If set to `true`, the underlying `FileSplitter` will emit additional *start-of-file* and *end-of-file* marker messages before and after the actual data. The payload of these 2 additional marker messages is of type `FileSplitter.FileMarker`. The option `withMarkers` defaults to `false` if not explicitly set.

Input

N/A (Reads from a file system directory).

Output

mode = contents

Headers:

- `Content-Type: application/octet-stream`
- `file_originalFile: <java.io.File>`
- `file_name: <file name>`

Payload:

A `byte[]` filled with the file contents.

mode = lines

Headers:

- `Content-Type: text/plain`
- `file_originalFile: <java.io.File>`
- `file_name: <file name>`
- `correlationId: <UUID>` (same for each line)
- `sequenceNumber: <n>`
- `sequenceSize: 0` (number of lines is not know until the file is read)

Payload:

A `String` for each line.

The first line is optionally preceded by a message with a START marker payload. The last line is optionally followed by a message with an END marker payload.

Marker presence and format are determined by the `with-markers` and `markers-json` properties.

mode = ref

Headers:

None.

Payload:

A `java.io.File` object.

Options

The **file** source has the following options:

file.consumer.markers-json
: When 'fileMarkers == true', specify if they should be produced as FileSplitter.FileMarker objects or JSON. **(Boolean, default: `true`)**

file.consumer.mode
: The FileReadingMode to use for file reading sources. Values are 'ref' - The File object, 'lines' - a message per line, or 'contents' - the contents as bytes. **(FileReadingMode, default: <none>, possible values: `ref`,`lines`,`contents`)**

file.consumer.with-markers
: Set to true to emit start of file/end of file marker messages before/after the data. Only valid with FileReadingMode 'lines'. **(Boolean, default: <none>)**

file.directory
: The directory to poll for new files. **(String, default: <none>)**

file.filename-pattern
: A simple ant pattern to match files. **(String, default: <none>)**

file.filename-regex
: A regex pattern to match files. **(Pattern, default: <none>)**

file.prevent-duplicates
: Set to true to include an AcceptOnceFileListFilter which prevents duplicates. **(Boolean, default: `true`)**

trigger.cron
: Cron expression value for the Cron Trigger. **(String, default: <none>)**

trigger.date-format
: Format for the date value. **(String, default: <none>)**

trigger.fixed-delay
: Fixed delay for periodic triggers. **(Integer, default: `1`)**

trigger.initial-delay
: Initial delay for periodic triggers. **(Integer, default: `0`)**

trigger.max-messages
: Maximum messages per poll, -1 means infinity. **(Long, default: `-1`)**

trigger.time-unit
: The TimeUnit to apply to delay values. **(TimeUnit, default: `SECONDS`, possible values: `NANOSECONDS`,`MICROSECONDS`,`MILLISECONDS`,`SECONDS`,`MINUTES`,`HOURS`,`DAYS`)**

The `ref` option is useful in some cases in which the file contents are large and it would be more efficient to send the file path.

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps

You can find the corresponding binder based projects here. You can then cd into one of the folders and
 build it:

$ ./mvnw clean package
```

Examples

```
java -jar file_source.jar --file.directory=/tmp/foo --file.consumer.mode=lines --trigger.fixed-delay=60
```

2.2 FTP Source

This source application supports transfer of files using the FTP protocol. Files are transferred from the `remote` directory to the `local` directory where the app is deployed. Messages emitted by the source are provided as a byte array by default. However, this can be customized using the `--mode` option:

- **ref** Provides a `java.io.File` reference
- **lines** Will split files line-by-line and emit a new message for each line
- **contents** The default. Provides the contents of a file as a byte array

When using `--mode=lines`, you can also provide the additional option `--withMarkers=true`. If set to `true`, the underlying `FileSplitter` will emit additional *start-of-file* and *end-of-file* marker messages before and after the actual data. The payload of these 2 additional marker messages is of type `FileSplitter.FileMarker`. The option `withMarkers` defaults to `false` if not explicitly set.

See also `MetaDataStore` options for possible shared persistent store configuration for the `FtpPersistentAcceptOnceFileListFilter` used in the FTP Source.

Input

N/A (Fetches files from an FTP server).

Output

mode = contents

Headers:

- `Content-Type: application/octet-stream`

- `file_originalFile: <java.io.File>`
- `file_name: <file name>`

Payload:

A `byte[]` filled with the file contents.

mode = lines

Headers:

- `Content-Type: text/plain`
- `file_orginalFile: <java.io.File>`
- `file_name: <file name>`
- `correlationId: <UUID>` (same for each line)
- `sequenceNumber: <n>`
- `sequenceSize: 0` (number of lines is not know until the file is read)

Payload:

A `String` for each line.

The first line is optionally preceded by a message with a `START` marker payload. The last line is optionally followed by a message with an `END` marker payload.

Marker presence and format are determined by the `with-markers` and `markers-json` properties.

mode = ref

Headers:

None.

Payload:

A `java.io.File` object.

Options

The **ftp** source has the following options:

file.consumer.markers-json
: When 'fileMarkers == true', specify if they should be produced as FileSplitter.FileMarker objects or JSON. **(Boolean, default: `true`)**

file.consumer.mode
: The FileReadingMode to use for file reading sources. Values are 'ref' - The File object, 'lines' - a message per line, or 'contents' - the contents as bytes. **(FileReadingMode, default: <none>, possible values: `ref`,`lines`,`contents`)**

file.consumer.with-markers
: Set to true to emit start of file/end of file marker messages before/after the data. Only valid with FileReadingMode 'lines'. **(Boolean, default: <none>)**

ftp.auto-create-local-dir
: Set to true to create the local directory if it does not exist. **(Boolean, default: `true`)**

ftp.delete-remote-files
: Set to true to delete remote files after successful transfer. **(Boolean, default: `false`)**

ftp.factory.cache-sessions
: <documentation missing> **(Boolean, default: <none>)**

ftp.factory.client-mode
: The client mode to use for the FTP session. **(ClientMode, default: <none>, possible values: `ACTIVE`,`PASSIVE`)**

ftp.factory.host
: <documentation missing> **(String, default: <none>)**

ftp.factory.password
: <documentation missing> **(String, default: <none>)**

ftp.factory.port
: The port of the server. **(Integer, default: `21`)**

ftp.factory.username
: <documentation missing> **(String, default: <none>)**

ftp.filename-pattern
: A filter pattern to match the names of files to transfer. **(String, default: <none>)**

ftp.filename-regex
: A filter regex pattern to match the names of files to transfer. **(Pattern, default: <none>)**

ftp.local-dir
: The local directory to use for file transfers. **(File, default: <none>)**

ftp.preserve-timestamp
: Set to true to preserve the original timestamp. **(Boolean, default: `true`)**

ftp.remote-dir
: The remote FTP directory. **(String, default: `/`)**

ftp.remote-file-separator
: The remote file separator. **(String, default: `/`)**

ftp.tmp-file-suffix
: The suffix to use while the transfer is in progress. **(String, default: `.tmp`)**

trigger.cron
: Cron expression value for the Cron Trigger. **(String, default: <none>)**

trigger.date-format
: Format for the date value. **(String, default: <none>)**

trigger.fixed-delay
: Fixed delay for periodic triggers. **(Integer, default: `1`)**

trigger.initial-delay
: Initial delay for periodic triggers. **(Integer, default: `0`)**

trigger.max-messages
: Maximum messages per poll, -1 means infinity. **(Long, default: `-1`)**

trigger.time-unit
: The TimeUnit to apply to delay values. **(TimeUnit, default: `SECONDS`, possible values: `NANOSECONDS`,`MICROSECONDS`,`MILLISECONDS`,`SECONDS`,`MINUTES`,`HOURS`,`DAYS`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar ftp_source.jar --ftp.remote-dir=foo --file.mode=lines --trigger.fixed-delay=60 --
ftp.factory.host=ftpserver \
         --ftp.factory.username=user --ftp.factory.password=pw --ftp.local-dir=/foo
```

2.3 Gemfire Source

This source allows you to subscribe to any creates or updates to a Gemfire region. The application configures a client cache and client region, along with the necessary subscriptions enabled. By default the payload contains the updated entry value, but may be controlled by passing in a SpEL expression that uses the EntryEvent as the evaluation context.

To enable SSL communication between Geode Source and the Geode cluster you need to provide the URIs of the Keystore and Truststore files using the `gemfire.security.ssl.keystore-uri` and `gemfire.security.ssl.truststore-uri` properties. (If a single file is ued for both stores then point both URIs to it).

Input

N/A

Output

Headers

- `content-type: text/plain`

Payload

- `String`

Options

The **gemfire** source supports the following configuration properties:

gemfire.cache-event-expression
: SpEL expression to extract fields from a cache event. **(Expression, default: <none>)**

gemfire.pool.connect-type
: Specifies connection type: 'server' or 'locator'. **(ConnectType, default: <none>, possible values: `locator`,`server`)**

gemfire.pool.host-addresses
: Specifies one or more Gemfire locator or server addresses formatted as [host]:[port]. **(InetSocketAddress[], default: <none>)**

gemfire.pool.subscription-enabled
: Set to true to enable subscriptions for the client pool. Required to sync updates to the client cache. **(Boolean, default: `false`)**

gemfire.region.region-name
: The region name. **(String, default: <none>)**

gemfire.security.password
: The cache password. **(String, default: <none>)**

gemfire.security.ssl.ciphers
: Configures the SSL ciphers used for secure Socket connections as an array of valid cipher names. **(String, default: any)**

gemfire.security.ssl.keystore-type
: Identifies the type of Keystore used for SSL communications (e.g. JKS, PKCS11, etc.). **(String, default: `JKS`)**

gemfire.security.ssl.keystore-uri
: Location of the pre-created Keystore URI to be used for connecting to the Geode cluster. **(Resource, default: <none>)**

gemfire.security.ssl.ssl-keystore-password
: Password for accessing the keys truststore **(String, default: <none>)**

gemfire.security.ssl.ssl-truststore-password
: Password for accessing the trust store. **(String, default: <none>)**

gemfire.security.ssl.truststore-type
: Identifies the type of truststore used for SSL communications (e.g. JKS, PKCS11, etc.). **(String, default: `JKS`)**

gemfire.security.ssl.truststore-uri
: Location of the pre-created truststore URI to be used for connecting to the Geode cluster. **(Resource, default: <none>)**

gemfire.security.ssl.user-home-directory
: Local directory to cache the truststore and keystore files downloaded form the truststoreUri and keystoreUri locations. **(String, default: `user.home`)**

gemfire.security.username
: The cache username. **(String, default: <none>)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar ./gemfire-source.jar --gemfire.region.region-name=MyRegion --
gemfire.cacheEventExpression="newValue"
```

2.4 Gemfire-CQ Source

Continuous query allows client applications to create a GemFire query using Object Query Language (OQL) and to register a CQ listener which subscribes to the query and is notified every time the query's result set changes. The gemfire-cq source registers a CQ which will post CQEvent messages to the stream.

To enable SSL communication between Geode CQ and the Geode cluster you need to provide the URIs of the Keystore and Truststore files using the `gemfire.security.ssl.keystore-uri` and `gemfire.security.ssl.truststore-uri` properties. (If a single file is ued for both stores then point both URIs to it).

Input

N/A

Output

Headers

- `content-type: text/plain`

Payload

- `String`

Options

The **gemfire-cq** source supports the following configuration properties:

gemfire.cq-event-expression
: SpEL expression to use to extract data from a cq event. **(Expression, default: <none>)**

gemfire.pool.connect-type
: Specifies connection type: 'server' or 'locator'. **(ConnectType, default: <none>, possible values: `locator`,`server`)**

gemfire.pool.host-addresses
: Specifies one or more Gemfire locator or server addresses formatted as [host]:[port]. **(InetSocketAddress[], default: <none>)**

gemfire.pool.subscription-enabled
: Set to true to enable subscriptions for the client pool. Required to sync updates to the client cache. **(Boolean, default: `false`)**

gemfire.query
: The OQL query **(String, default: <none>)**

gemfire.security.password
: The cache password. **(String, default: <none>)**

gemfire.security.ssl.ciphers
: Configures the SSL ciphers used for secure Socket connections as an array of valid cipher names. **(String, default: any)**

gemfire.security.ssl.keystore-type
: Identifies the type of Keystore used for SSL communications (e.g. JKS, PKCS11, etc.). **(String, default: `JKS`)**

gemfire.security.ssl.keystore-uri
: Location of the pre-created Keystore URI to be used for connecting to the Geode cluster. **(Resource, default: <none>)**

gemfire.security.ssl.ssl-keystore-password
: Password for accessing the keys truststore **(String, default: <none>)**

gemfire.security.ssl.ssl-truststore-password
: Password for accessing the trust store. **(String, default: <none>)**

gemfire.security.ssl.truststore-type
: Identifies the type of truststore used for SSL communications (e.g. JKS, PKCS11, etc.). **(String, default: `JKS`)**

gemfire.security.ssl.truststore-uri
: Location of the pre-created truststore URI to be used for connecting to the Geode cluster. **(Resource, default: <none>)**

gemfire.security.ssl.user-home-directory
: Local directory to cache the truststore and keystore files downloaded form the truststoreUri and keystoreUri locations. **(String, default: `user.home`)**

gemfire.security.username
: The cache username. **(String, default: <none>)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar gemfire-cq-source.jar --gemfire.query=
```

2.5 Http Source

A source application that listens for HTTP requests and emits the body as a message payload. If the Content-Type matches `text/*` or `application/json`, the payload will be a String, otherwise the payload will be a byte array.

Input

N/A

Output

Headers:

- `Content-Type: Any`

Payload:

If content type matches `text/*` or `application/json`

- `String`

If content type does not match `text/*` or `application/json`

- `byte array`

Options

The **http** source supports the following configuration properties:

http.cors.allow-credentials
: Whether the browser should include any cookies associated with the domain of the request being annotated. **(Boolean, default: <none>)**

http.cors.allowed-headers
: List of request headers that can be used during the actual request. **(String[], default: <none>)**

http.cors.allowed-origins
: List of allowed origins, e.g. "http://domain1.com". **(String[], default: <none>)**

http.mapped-request-headers
: Headers that will be mapped. **(String[], default: <none>)**

http.path-pattern
: An Ant-Style pattern to determine which http requests will be captured. **(String, default: /)**

server.port
: Server HTTP port. **(Integer, default: `8080`)**

Note

Security is disabled for this application by default. To enable it, you should use the mentioned above `http.enable-security = true` property.

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar http_source.jar
```

2.6 JDBC Source

This source polls data from an RDBMS. This source is fully based on the `DataSourceAutoConfiguration`, so refer to the Spring Boot JDBC Support for more information.

Input

N/A

Output

Headers

- `Content-Type: application/x-java-object`

Payload

- `Map<String, Object>` when `jdbc.split == true` (default) and `List<Map<String, Object>>` otherwise

Options

The **jdbc** source has the following options:

jdbc.max-rows-per-poll
: Max numbers of rows to process for each poll. **(Integer, default: `0`)**

jdbc.query
: The query to use to select data. **(String, default: <none>)**

jdbc.split
: Whether to split the SQL result as individual messages. **(Boolean, default: `true`)**

jdbc.update
: An SQL update statement to execute for marking polled messages as 'seen'. **(String, default: <none>)**

spring.datasource.data
: Data (DML) script resource references. **(List<String>, default: <none>)**

spring.datasource.driver-class-name
: Fully qualified name of the JDBC driver. Auto-detected based on the URL by default. **(String, default: <none>)**

spring.datasource.initialization-mode
: Initialize the datasource using available DDL and DML scripts. **(DataSourceInitializationMode, default: embedded, possible values: `ALWAYS`,`EMBEDDED`,`NEVER`)**

spring.datasource.password
: Login password of the database. **(String, default: <none>)**

spring.datasource.schema
: Schema (DDL) script resource references. **(List<String>, default: <none>)**

spring.datasource.url
: JDBC url of the database. **(String, default: <none>)**

spring.datasource.username
: Login username of the database. **(String, default: <none>)**

trigger.cron
: Cron expression value for the Cron Trigger. **(String, default: <none>)**

trigger.date-format
: Format for the date value. **(String, default: <none>)**

trigger.fixed-delay
: Fixed delay for periodic triggers. **(Integer, default: `1`)**

trigger.initial-delay
: Initial delay for periodic triggers. **(Integer, default: `0`)**

trigger.max-messages
: Maximum messages per poll, -1 means infinity. **(Long, default: `1`)**

trigger.time-unit
: The TimeUnit to apply to delay values. **(TimeUnit, default: <none>, possible values: `NANOSECONDS`,`MICROSECONDS`,`MILLISECONDS`,`SECONDS`,`MINUTES`,`HOURS`,`DAYS`)**

Also see the Spring Boot Documentation for addition `DataSource` properties and `TriggerProperties` and `MaxMessagesProperties` for polling options.

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar jdbc_source.jar --query=<QUERY> [datasource credentials]
```

2.7 JMS Source

The "jms" source enables receiving messages from JMS.

Input

N/A

Output

Headers

- `content-type: text/plain`

Payload

- `String`

Headers

- `content-type: application/octet-stream`

Payload

- `byte[]`

Headers

- `content-type: application/x-java-serialized-object`

Payload

- `java.io.Serializable`

Headers

- `content-type: application/x-java-object`

Payload

- `Map`

Options

The **jms** source has the following options:

jms.client-id
: Client id for durable subscriptions. **(String, default: <none>)**

jms.destination
: The destination from which to receive messages (queue or topic). **(String, default: <none>)**

jms.message-selector
: A selector for messages; **(String, default: <none>)**

jms.session-transacted
: True to enable transactions and select a DefaultMessageListenerContainer, false to select a SimpleMessageListenerContainer. **(Boolean, default: `true`)**

jms.subscription-durable
: True for a durable subscription. **(Boolean, default: <none>)**

jms.subscription-name
: The name of a durable or shared subscription. **(String, default: <none>)**

jms.subscription-shared
: True for a shared subscription. **(Boolean, default: <none>)**

spring.jms.jndi-name
: Connection factory JNDI name. When set, takes precedence to others connection factory auto-configurations. **(String, default: <none>)**

spring.jms.listener.acknowledge-mode
: Acknowledge mode of the container. By default, the listener is transacted with automatic acknowledgment. **(AcknowledgeMode, default: <none>, possible values: `AUTO`,`CLIENT`,`DUPS_OK`)**

spring.jms.listener.auto-startup
: Start the container automatically on startup. **(Boolean, default: `true`)**

spring.jms.listener.concurrency
: Minimum number of concurrent consumers. **(Integer, default: <none>)**

spring.jms.listener.max-concurrency
: Maximum number of concurrent consumers. **(Integer, default: <none>)**

spring.jms.pub-sub-domain
: Whether the default destination type is topic. **(Boolean, default: `false`)**

Note

Spring boot broker configuration is used; refer to the Spring Boot Documentation for more information. The `spring.jms.*` properties above are also handled by the boot JMS support.

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar jms-source.jar --jms.destination=
```

2.8 Load Generator Source

A source that sends generated data and dispatches it to the stream. This is to provide a method for users to identify the performance of Spring Cloud Data Flow in different environments and deployment types.

Input

N/A

Output

Headers:

- `Content-Type: application/octet-stream`

Payload:

- `byte[]`

Options

The **load-generator** source has the following options:

load-generator.generate-timestamp
  <documentation missing> **(Boolean, default: `false`)**

load-generator.message-count
  <documentation missing> **(Integer, default: `1000`)**

load-generator.message-size
  <documentation missing> **(Integer, default: `1000`)**

load-generator.producers
  <documentation missing> **(Integer, default: `1`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar load-generator-source.jar
```

2.9 Loggregator Source

A source that can be used to read logging messages from Cloud Foundry Loggregator.

Input

N/A

Output

Headers:

- `Content-Type: text/plain`

Payload:

A `String` with the log message.

Options

The **loggregator** source has the following options:

loggregator.application-name
  <documentation missing> **(String, default: <none>)**

loggregator.cloud-foundry-api
  <documentation missing> **(String, default: <none>)**

loggregator.cloud-foundry-password
  <documentation missing> **(String, default: <none>)**

loggregator.cloud-foundry-user
  <documentation missing> **(String, default: <none>)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar loggregator-source.jar --cloudFoundryApi="api" --cloudFoundryUser="CF user" --
cloudFoundryPassword="CF password \
    --applicationName=app-name
```

2.10 Mail Source

A source module that listens for Emails and emits the message body as a message payload.

Input

N/A

Output

Headers

- `content-type: text/plain`

Payload

- `String`

Options

The **mail** source supports the following configuration properties:

mail.charset
: The charset for byte[] mail-to-string transformation. **(String, default: `UTF-8`)**

mail.delete
: Set to true to delete email after download. **(Boolean, default: `false`)**

mail.expression
: Configure a SpEL expression to select messages. **(String, default: `true`)**

mail.idle-imap
: Set to true to use IdleImap Configuration. **(Boolean, default: `false`)**

mail.java-mail-properties
: JavaMail properties as a new line delimited string of name-value pairs, e.g. 'foo=bar\n baz=car'. **(Properties, default: <none>)**

mail.mark-as-read
: Set to true to mark email as read. **(Boolean, default: `false`)**

mail.url
: Mail connection URL for connection to Mail server e.g. 'imaps://username:password@imap.server.com:993/Inbox'. **(URLName, default: <none>)**

mail.user-flag
: The flag to mark messages when the server does not support \Recent **(String, default: <none>)**

trigger.cron
: Cron expression value for the Cron Trigger. **(String, default: <none>)**

trigger.date-format
: Format for the date value. **(String, default: <none>)**

trigger.fixed-delay
: Fixed delay for periodic triggers. **(Integer, default: `1`)**

trigger.initial-delay
: Initial delay for periodic triggers. **(Integer, default: `0`)**

trigger.max-messages
: Maximum messages per poll, -1 means infinity. **(Long, default: `1`)**

trigger.time-unit
: The TimeUnit to apply to delay values. **(TimeUnit, default: <none>, possible values: `NANOSECONDS`,`MICROSECONDS`,`MILLISECONDS`,`SECONDS`,`MINUTES`,`HOURS`,`DAYS`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar mail-source.jar --mail.javaMailProperties= --mail.url= --mail.expression= \
    --mail.charset= --mail.userFlag=
```

2.11 MongoDB Source

This source polls data from MongoDB. This source is fully based on the `MongoDataAutoConfiguration`, so refer to the Spring Boot MongoDB Support for more information.

Input

N/A

Output

Headers:

- `Content-Type: text/plain`

Payload:

- `String`

Options

The **mongodb** source has the following options:

mongodb.collection
: The MongoDB collection to query **(String, default: <none>)**

mongodb.query
: The MongoDB query **(String, default: `{ }`)**

mongodb.query-expression
: The SpEL expression in MongoDB query DSL style **(Expression, default: <none>)**

mongodb.split
: Whether to split the query result as individual messages. **(Boolean, default: `true`)**

spring.data.mongodb.authentication-database
: Authentication database name. **(String, default: <none>)**

spring.data.mongodb.database
: Database name. **(String, default: <none>)**

spring.data.mongodb.field-naming-strategy
: Fully qualified name of the FieldNamingStrategy to use. **(Class<?>, default: <none>)**

spring.data.mongodb.grid-fs-database
: GridFS database name. **(String, default: <none>)**

spring.data.mongodb.host
: Mongo server host. Cannot be set with URI. **(String, default: <none>)**

spring.data.mongodb.password
: Login password of the mongo server. Cannot be set with URI. **(Character[], default: <none>)**

spring.data.mongodb.port
: Mongo server port. Cannot be set with URI. **(Integer, default: <none>)**

spring.data.mongodb.uri
: Mongo database URI. Cannot be set with host, port and credentials. **(String, default: `mongodb://localhost/test`)**

spring.data.mongodb.username
: Login user of the mongo server. Cannot be set with URI. **(String, default: <none>)**

trigger.cron
: Cron expression value for the Cron Trigger. **(String, default: <none>)**

trigger.date-format
: Format for the date value. **(String, default: <none>)**

trigger.fixed-delay
: Fixed delay for periodic triggers. **(Integer, default: `1`)**

trigger.initial-delay
: Initial delay for periodic triggers. **(Integer, default: `0`)**

trigger.max-messages
: Maximum messages per poll, -1 means infinity. **(Long, default: `-1`)**

trigger.time-unit
: The TimeUnit to apply to delay values. **(TimeUnit, default: `SECONDS`, possible values: `NANOSECONDS`,`MICROSECONDS`,`MILLISECONDS`,`SECONDS`,`MINUTES`,`HOURS`,`DAYS`)**

Also see the Spring Boot Documentation for additional `MongoProperties` properties. See and `TriggerProperties` for polling options.

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar mongodb-source.jar --mongodb.query= --mongodb.collection=
```

2.12 MQTT Source

The "mqtt" source enables receiving messages from MQTT.

Input

N/A

Output

Headers:

Payload:

- `String` if binary setting is `false` (default)
- `byte[]` if binary setting is `true`

Options

The **mqtt** source has the following options:

mqtt.binary
: true to leave the payload as bytes **(Boolean, default: `false`)**

mqtt.charset
: the charset used to convert bytes to String (when binary is false) **(String, default: `UTF-8`)**

mqtt.clean-session
: whether the client and server should remember state across restarts and reconnects **(Boolean, default: `true`)**

mqtt.client-id
: identifies the client **(String, default: `stream.client.id.source`)**

mqtt.connection-timeout
: the connection timeout in seconds **(Integer, default: `30`)**

mqtt.keep-alive-interval
: the ping interval in seconds **(Integer, default: `60`)**

mqtt.password
: the password to use when connecting to the broker **(String, default: `guest`)**

mqtt.persistence
: 'memory' or 'file' **(String, default: `memory`)**

mqtt.persistence-directory
: Persistence directory **(String, default: `/tmp/paho`)**

mqtt.qos
: the qos; a single value for all topics or a comma-delimited list to match the topics **(int[], default: `[0]`)**

mqtt.topics
: the topic(s) (comma-delimited) to which the source will subscribe **(String[], default: `[stream.mqtt]`)**

mqtt.url
: location of the mqtt broker(s) (comma-delimited list) **(String[], default: `[tcp://localhost:1883]`)**

mqtt.username
: the username to use when connecting to the broker **(String, default: `guest`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar mqtt-source.jar --mqtt.clientId=
```

2.13 RabbitMQ Source

The "rabbit" source enables receiving messages from RabbitMQ.

The queue(s) must exist before the stream is deployed; they are not created automatically. You can easily create a Queue using the RabbitMQ web UI.

Input

N/A

Output

Headers

- `content-type: text/plain`

Payload

- `String`

Headers

- `content-type: application/octet-stream`

Payload

- `byte[]`

Headers

- `content-type: application/x-java-serialized-object`

Payload

- `java.io.Serializable`

Options

The **rabbit** source has the following options:

rabbit.enable-retry
true to enable retry. **(Boolean, default: `false`)**

rabbit.initial-retry-interval
Initial retry interval when retry is enabled. **(Integer, default: `1000`)**

rabbit.mapped-request-headers
Headers that will be mapped. **(String[], default: `[STANDARD_REQUEST_HEADERS]`)**

rabbit.max-attempts
The maximum delivery attempts when retry is enabled. **(Integer, default: 3)**

rabbit.max-retry-interval
Max retry interval when retry is enabled. **(Integer, default: `30000`)**

rabbit.own-connection
When true, use a separate connection based on the boot properties. **(Boolean, default: `false`)**

rabbit.queues
The queues to which the source will listen for messages. **(String[], default: <none>)**

rabbit.requeue
Whether rejected messages should be requeued. **(Boolean, default: `true`)**

rabbit.retry-multiplier
Retry backoff multiplier when retry is enabled. **(Double, default: 2)**

rabbit.transacted
Whether the channel is transacted. **(Boolean, default: `false`)**

spring.rabbitmq.addresses
Comma-separated list of addresses to which the client should connect. **(String, default: <none>)**

spring.rabbitmq.connection-timeout
Connection timeout. Set it to zero to wait forever. **(Duration, default: <none>)**

spring.rabbitmq.host
RabbitMQ host. **(String, default: `localhost`)**

spring.rabbitmq.password
Login to authenticate against the broker. **(String, default: `guest`)**

spring.rabbitmq.port
RabbitMQ port. **(Integer, default: `5672`)**

spring.rabbitmq.publisher-confirms
Whether to enable publisher confirms. **(Boolean, default: `false`)**

spring.rabbitmq.publisher-returns
Whether to enable publisher returns. **(Boolean, default: `false`)**

spring.rabbitmq.requested-heartbeat
Requested heartbeat timeout; zero for none. If a duration suffix is not specified, seconds will be used. **(Duration, default: <none>)**

spring.rabbitmq.username
Login user to authenticate to the broker. **(String, default: `guest`)**

spring.rabbitmq.virtual-host
Virtual host to use when connecting to the broker. **(String, default: <none>)**

Also see the Spring Boot Documentation for addition properties for the broker connections and listener properties.

A Note About Retry

Note

With the default *ackMode* (**AUTO**) and *requeue* (**true**) options, failed message deliveries will be retried indefinitely. Since there is not much processing in the rabbit source, the risk of failure in the source itself is small, unless the downstream `Binder` is not connected for some reason. Setting *requeue* to **false** will cause messages to be rejected on the first attempt (and possibly sent to a Dead Letter Exchange/Queue if the broker is so configured). The *enableRetry* option allows configuration of retry parameters such that a failed message delivery can be retried and eventually discarded (or dead-lettered) when retries are exhausted. The delivery thread is suspended during the retry interval(s). Retry options are *enableRetry*, *maxAttempts*, *initialRetryInterval*, *retryMultiplier*, and *maxRetryInterval*. Message deliveries failing with a *MessageConversionException* are never retried; the assumption being that if a message could not be converted on the first attempt, subsequent attempts will also fail. Such messages are discarded (or dead-lettered).

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar rabbit-source.jar --rabbit.queues=
```

2.14 Amazon S3 Source

This source app supports transfer of files using the Amazon S3 protocol. Files are transferred from the `remote` directory (S3 bucket) to the `local` directory where the application is deployed.

Messages emitted by the source are provided as a byte array by default. However, this can be customized using the `--mode` option:

- **ref** Provides a `java.io.File` reference
- **lines** Will split files line-by-line and emit a new message for each line
- **contents** The default. Provides the contents of a file as a byte array

When using `--mode=lines`, you can also provide the additional option `--withMarkers=true`. If set to `true`, the underlying `FileSplitter` will emit additional *start-of-file* and *end-of-file* marker messages before and after the actual data. The payload of these 2 additional marker messages is of type `FileSplitter.FileMarker`. The option `withMarkers` defaults to `false` if not explicitly set.

Input

N/A

Output

mode = contents

Headers:

- `Content-Type: application/octet-stream`
- `file_orginalFile: <java.io.File>`
- `file_name: <file name>`

Payload:

A `byte[]` filled with the file contents.

mode = lines

Headers:

- `Content-Type: text/plain`
- `file_orginalFile: <java.io.File>`
- `file_name: <file name>`
- `correlationId: <UUID>` (same for each line)
- `sequenceNumber: <n>`
- `sequenceSize: 0` (number of lines is not know until the file is read)

Payload:

A `String` for each line.

The first line is optionally preceded by a message with a `START` marker payload. The last line is optionally followed by a message with an `END` marker payload.

Marker presence and format are determined by the `with-markers` and `markers-json` properties.

mode = ref

Headers:

None.

Payload:

A `java.io.File` object.

Options

The **s3** source has the following options:

file.consumer.markers-json
: When 'fileMarkers == true', specify if they should be produced as FileSplitter.FileMarker objects or JSON. **(Boolean, default: `true`)**

file.consumer.mode
: The FileReadingMode to use for file reading sources. Values are 'ref' - The File object, 'lines' - a message per line, or 'contents' - the contents as bytes. **(FileReadingMode, default: <none>, possible values: `ref`,`lines`,`contents`)**

file.consumer.with-markers
: Set to true to emit start of file/end of file marker messages before/after the data. Only valid with FileReadingMode 'lines'. **(Boolean, default: <none>)**

s3.auto-create-local-dir
: Create or not the local directory. **(Boolean, default: `true`)**

s3.delete-remote-files
: Delete or not remote files after processing. **(Boolean, default: `false`)**

s3.filename-pattern
: The pattern to filter remote files. **(String, default: <none>)**

s3.filename-regex
: The regexp to filter remote files. **(Pattern, default: <none>)**

s3.local-dir
: The local directory to store files. **(File, default: <none>)**

s3.preserve-timestamp
: To transfer or not the timestamp of the remote file to the local one. **(Boolean, default: `true`)**

s3.remote-dir
: AWS S3 bucket resource. **(String, default: `bucket`)**

s3.remote-file-separator
: Remote File separator. **(String, default: `/`)**

s3.tmp-file-suffix
: Temporary file suffix. **(String, default: `.tmp`)**

trigger.cron
: Cron expression value for the Cron Trigger. **(String, default: <none>)**

trigger.date-format
: Format for the date value. **(String, default: <none>)**

trigger.fixed-delay
: Fixed delay for periodic triggers. **(Integer, default: `1`)**

trigger.initial-delay
: Initial delay for periodic triggers. **(Integer, default: `0`)**

trigger.max-messages
: Maximum messages per poll, -1 means infinity. **(Long, default: `-1`)**

trigger.time-unit
: The TimeUnit to apply to delay values. **(TimeUnit, default: `SECONDS`, possible values: `NANOSECONDS`,`MICROSECONDS`,`MILLISECONDS`,`SECONDS`,`MINUTES`,`HOURS`,`DAYS`)**

Amazon AWS common options

The Amazon S3 Source (as all other Amazon AWS applications) is based on the Spring Cloud AWS project as a foundation, and its auto-configuration classes are used automatically by Spring Boot. Consult their documentation regarding required and useful auto-configuration properties.

Some of them are about AWS credentials:

- cloud.aws.credentials.accessKey
- cloud.aws.credentials.secretKey
- cloud.aws.credentials.instanceProfile
- cloud.aws.credentials.profileName
- cloud.aws.credentials.profilePath

Other are for AWS `Region` definition:

- cloud.aws.region.auto
- cloud.aws.region.static

And for AWS `Stack`:

- cloud.aws.stack.auto
- cloud.aws.stack.name

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar s3-source.jar --s3.remoteDir=/tmp/foo --file.consumer.mode=lines --trigger.fixed-delay=60
```

2.15 SFTP Source

This source app supports transfer of files using the SFTP protocol. Files are transferred from the `remote` directory to the `local` directory where the application is deployed.

Messages emitted by the source are provided as a byte array by default. However, this can be customized using the `--mode` option:

- **ref** Provides a `java.io.File` reference

- **lines** Will split files line-by-line and emit a new message for each line
- **contents** The default. Provides the contents of a file as a byte array

When using `--mode=lines`, you can also provide the additional option `--withMarkers=true`. If set to `true`, the underlying `FileSplitter` will emit additional *start-of-file* and *end-of-file* marker messages before and after the actual data. The payload of these 2 additional marker messages is of type `FileSplitter.FileMarker`. The option `withMarkers` defaults to `false` if not explicitly set.

When configuring the `sftp.factory.known-hosts-expression` option, the root object of the evaluation is the application context, an example might be `sftp.factory.known-hosts-expression = @systemProperties['user.home'] + '/.ssh/known_hosts'`.

See also `MetadataStore` options for possible shared persistent store configuration for the `SftpPersistentAcceptOnceFileListFilter` and `IdempotentReceiverInterceptor` used in the SFTP Source.

Multiple SFTP Servers

This source supports polling multiple sftp servers. This requires configuring multiple session factories. The following configuration will poll two sftp servers, consuming files in a round-robin fashion:

```
sftp.factories.one.host=host1
sftp.factories.one.port=1234,
sftp.factories.one.username = user1,
sftp.factories.one.password = pass1,
...
sftp.factories.two.host=host2,
sftp.factories.two.port=2345,
sftp.factories.two.username = user2,
sftp.factories.two.password = pass2,
sftp.directories=one.sftpSource,two.sftpSecondSource,
sftp.max-fetch=1,
sftp.fair=true
```

Note

The TaskLaunchRequest output functionality is currently supported here for legacy reasons. If you are interested in this feature, we recommend using the sftp-datafow-source which is intended specifically for this use case. A task launch request posted to the Data Flow Server API is much simpler to use than the `TaskLaunchRequest` supported by this app which supports launching tasks using one of the provided platform specific task launchers. Using a platform specific task launcher makes it possible to launch tasks when a Data Flow server is not deployed, but requires several additional configuration parameters.

Input

N/A (Fetches files from an SFTP server).

Output

mode = contents

Headers:

- `Content-Type: application/octet-stream`

- `file_originalFile: <java.io.File>`
- `file_name: <file name>`

Payload:

A `byte[]` filled with the file contents.

mode = lines

Headers:

- `Content-Type: text/plain`
- `file_originalFile: <java.io.File>`
- `file_name: <file name>`
- `correlationId: <UUID>` (same for each line)
- `sequenceNumber: <n>`
- `sequenceSize: 0` (number of lines is not know until the file is read)

Payload:

A `String` for each line.

The first line is optionally preceded by a message with a `START` marker payload. The last line is optionally followed by a message with an `END` marker payload.

Marker presence and format are determined by the `with-markers` and `markers-json` properties.

mode = ref

Headers:

None.

Payload:

A `java.io.File` object.

task-launcher-output = true

Headers:

- `Content-Type: application/json`
- `file_remoteDirectory: <java.lang.String>`

Payload:

A TaskLaunchRequest object with the following set as command line arguments (also bound to job parameters for Spring Batch):

- `<task.local-file-path-parameter-name>=<task.local-file-path-parameter-value>`

- `<task.remote-file-path-parameter-name>=<task.remote-file-path-parameter-value>`
- Any provided`task.parameters`

`task.resource-uri` is required. `task.deployment-properties` and `task.environment-properties` are optional.

Options

The **sftp** source has the following options:

file.consumer.markers-json
: When 'fileMarkers == true', specify if they should be produced as FileSplitter.FileMarker objects or JSON. **(Boolean, default: `true`)**

file.consumer.mode
: The FileReadingMode to use for file reading sources. Values are 'ref' - The File object, 'lines' - a message per line, or 'contents' - the contents as bytes. **(FileReadingMode, default: <none>, possible values: `ref`,`lines`,`contents`)**

file.consumer.with-markers
: Set to true to emit start of file/end of file marker messages before/after the data. Only valid with FileReadingMode 'lines'. **(Boolean, default: <none>)**

sftp.auto-create-local-dir
: Set to true to create the local directory if it does not exist. **(Boolean, default: `true`)**

sftp.delete-remote-files
: Set to true to delete remote files after successful transfer. **(Boolean, default: `false`)**

sftp.directories
: A list of factory "name.directory" pairs. **(String[], default: <none>)**

sftp.factories
: A map of factory names to factories. **(Map<String, Factory>, default: <none>)**

sftp.factory.allow-unknown-keys
: True to allow an unknown or changed key. **(Boolean, default: `false`)**

sftp.factory.host
: The host name of the server. **(String, default: `localhost`)**

sftp.factory.known-hosts-expression
: A SpEL expression resolving to the location of the known hosts file. **(Expression, default: <none>)**

sftp.factory.pass-phrase
: Passphrase for user's private key. **(String, default: `<empty string>`)**

sftp.factory.password
: The password to use to connect to the server. **(String, default: <none>)**

sftp.factory.port
: The port of the server. **(Integer, default: `22`)**

sftp.factory.private-key
Resource location of user's private key. **(Resource, default: <none>)**

sftp.factory.username
The username to use to connect to the server. **(String, default: <none>)**

sftp.fair
True for fair polling of multiple servers/directories. **(Boolean, default: `false`)**

sftp.filename-pattern
A filter pattern to match the names of files to transfer. **(String, default: <none>)**

sftp.filename-regex
A filter regex pattern to match the names of files to transfer. **(Pattern, default: <none>)**

sftp.list-only
Set to true to return file metadata without the entire payload. **(Boolean, default: `false`)**

sftp.local-dir
The local directory to use for file transfers. **(File, default: <none>)**

sftp.max-fetch
The maximum number of remote files to fetch per poll; default unlimited. Does not apply when listing files or building task launch requests. **(Integer, default: <none>)**

sftp.preserve-timestamp
Set to true to preserve the original timestamp. **(Boolean, default: `true`)**

sftp.remote-dir
The remote FTP directory. **(String, default: `/`)**

sftp.remote-file-separator
The remote file separator. **(String, default: `/`)**

sftp.stream
Set to true to stream the file rather than copy to a local directory. **(Boolean, default: `false`)**

sftp.task-launcher-output
Set to true to create output suitable for a task launch request. **(Boolean, default: `false`)**

sftp.task.application-name
The task application name. **(String, default: <none>)**

sftp.task.data-source-password
The datasource password to be applied to the TaskLaunchRequest. **(String, default: <none>)**

sftp.task.data-source-url
The datasource url to be applied to the TaskLaunchRequest. Defaults to h2 in-memory JDBC datasource url. **(String, default: `jdbc:h2:tcp://localhost:19092/mem:dataflow`)**

sftp.task.data-source-user-name
The datasource user name to be applied to the TaskLaunchRequest. Defaults to "sa" **(String, default: `sa`)**

sftp.task.deployment-properties
: Comma delimited list of deployment properties to be applied to the TaskLaunchRequest. **(String, default: <none>)**

sftp.task.environment-properties
: Comma delimited list of environment properties to be applied to the TaskLaunchRequest. **(String, default: <none>)**

sftp.task.local-file-path-parameter-name
: Value to use as the local file parameter name. **(String, default: `localFilePath`)**

sftp.task.local-file-path-parameter-value
: The file path to use as the local file parameter value. Defaults to "java.io.tmpdir". **(String, default: <none>)**

sftp.task.parameters
: Comma separated list of optional parameters in key=value format. **(List<String>, default: <none>)**

sftp.task.remote-file-path-parameter-name
: Value to use as the remote file parameter name. **(String, default: `remoteFilePath`)**

sftp.task.resource-uri
: The URI of the task artifact to be applied to the TaskLaunchRequest. **(String, default: `<empty string>`)**

sftp.tmp-file-suffix
: The suffix to use while the transfer is in progress. **(String, default: `.tmp`)**

trigger.cron
: Cron expression value for the Cron Trigger. **(String, default: <none>)**

trigger.date-format
: Format for the date value. **(String, default: <none>)**

trigger.fixed-delay
: Fixed delay for periodic triggers. **(Integer, default: `1`)**

trigger.initial-delay
: Initial delay for periodic triggers. **(Integer, default: `0`)**

trigger.max-messages
: Maximum messages per poll, -1 means infinity. **(Long, default: `-1`)**

trigger.time-unit
: The TimeUnit to apply to delay values. **(TimeUnit, default: `SECONDS`, possible values: `NANOSECONDS`,`MICROSECONDS`,`MILLISECONDS`,`SECONDS`,`MINUTES`,`HOURS`,`DAYS`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar sftp_source.jar --sftp.remote-dir=foo --file.consumer.mode=lines --trigger.fixed-delay=60 \
         --sftp.factory.host=sftpserver --sftp.factory.username=user --sftp.factory.password=pw --
sftp.local-dir=/foo
```

2.16 SYSLOG Source

The syslog source receives SYSLOG packets over UDP, TCP, or both. RFC3164 (BSD) and RFC5424 formats are supported.

Input

N/A

Output

Headers

- `content-type: application/json`

Payload

- `Map of field/values`

Options

The **syslog** source has the following options:

syslog.buffer-size
: the buffer size used when decoding messages; larger messages will be rejected. **(Integer, default: `2048`)**

syslog.nio
: whether or not to use NIO (when supporting a large number of connections). **(Boolean, default: `false`)**

syslog.port
: The port to listen on. **(Integer, default: `1514`)**

syslog.protocol
: tcp or udp **(String, default: `tcp`)**

syslog.reverse-lookup
: whether or not to perform a reverse lookup on the incoming socket. **(Boolean, default: `false`)**

syslog.rfc
: '5424' or '3164' - the syslog format according the the RFC; 3164 is aka 'BSD' format. **(String, default: `3164`)**

syslog.socket-timeout
: the socket timeout. **(Integer, default: `0`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar syslog-source.jar --syslog.rfc=5424 --syslog.protocol=tcp
```

2.17 TCP

The `tcp` source acts as a server and allows a remote party to connect to it and submit data over a raw tcp socket.

TCP is a streaming protocol and some mechanism is needed to frame messages on the wire. A number of decoders are available, the default being 'CRLF' which is compatible with Telnet.

Messages produced by the TCP source application have a `byte[]` payload.

Input

N/A

Output

Headers:

- `Content-Type: application/octet-stream`

Payload:

- `byte[]`

Options

tcp.buffer-size
: The buffer size used when decoding messages; larger messages will be rejected. **(Integer, default: `2048`)**

tcp.decoder
: The decoder to use when receiving messages. **(Encoding, default: <none>, possible values: `CRLF`,`LF`,`NULL`,`STXETX`,`RAW`,`L1`,`L2`,`L4`)**

tcp.nio
: Whether or not to use NIO. **(Boolean, default: `false`)**

tcp.port
: The port on which to listen; 0 for the OS to choose a port. **(Integer, default: `1234`)**

tcp.reverse-lookup
: Perform a reverse DNS lookup on the remote IP Address; if false, just the IP address is included in the message headers. **(Boolean, default: `false`)**

tcp.socket-timeout
: The timeout (ms) before closing the socket when no data is received. **(Integer, default: `120000`)**

tcp.use-direct-buffers
: Whether or not to use direct buffers. **(Boolean, default: `false`)**

Available Decoders

Text Data

CRLF (default)
: text terminated by carriage return (0x0d) followed by line feed (0x0a)

LF
: text terminated by line feed (0x0a)

NULL
: text terminated by a null byte (0x00)

STXETX
: text preceded by an STX (0x02) and terminated by an ETX (0x03)

Text and Binary Data

RAW
: no structure - the client indicates a complete message by closing the socket

L1
: data preceded by a one byte (unsigned) length field (supports up to 255 bytes)

L2
: data preceded by a two byte (unsigned) length field (up to 2^{16}-1 bytes)

L4
: data preceded by a four byte (signed) length field (up to 2^{31}-1 bytes)

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar tcp_source.jar --tcp.decoder=LF
```

The "decoder" property determines the message format (default is termination with CRLF).

2.18 TCP Client as a Source which connects to a TCP server and receives data

Input

N/A

Output

Headers:

- `Content-Type: application/octet-stream`

Payload:

- `byte[]`

Options

The **tcp-client** source has the following options:

tcp.buffer-size
: The buffer size used when decoding messages; larger messages will be rejected. **(Integer, default: `2048`)**

tcp.charset
: The charset used when converting from bytes to String. **(String, default: `UTF-8`)**

tcp.decoder
: The decoder to use when receiving messages. **(Encoding, default: <none>, possible values: `CRLF`,`LF`,`NULL`,`STXETX`,`RAW`,`L1`,`L2`,`L4`)**

tcp.host
: The host to which this client will connect. **(String, default: `localhost`)**

tcp.nio
: Whether or not to use NIO. **(Boolean, default: `false`)**

tcp.port
: The port on which to listen; 0 for the OS to choose a port. **(Integer, default: `1234`)**

tcp.retry-interval
: Retry interval (in milliseconds) to check the connection and reconnect. **(Long, default: `60000`)**

tcp.reverse-lookup
: Perform a reverse DNS lookup on the remote IP Address; if false, just the IP address is included in the message headers. **(Boolean, default: `false`)**

tcp.socket-timeout
: The timeout (ms) before closing the socket when no data is received. **(Integer, default: `120000`)**

tcp.use-direct-buffers
: Whether or not to use direct buffers. **(Boolean, default: `false`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar tcp_client_source.jar --tcp.decoder=LF
```

2.19 Time Source

The time source will simply emit a String with the current time every so often.

Input

N/A

Output

Headers:

- `Content-Type: text/plain`

Payload:

A `String` with the time output.

Options

The **time** source has the following options:

trigger.cron
: Cron expression value for the Cron Trigger. **(String, default: <none>)**

trigger.date-format
: Format for the date value. **(String, default: <none>)**

trigger.fixed-delay
: Fixed delay for periodic triggers. **(Integer, default: `1`)**

trigger.initial-delay
: Initial delay for periodic triggers. **(Integer, default: `0`)**

trigger.max-messages
: Maximum messages per poll, -1 means infinity. **(Long, default: `1`)**

trigger.time-unit
: The TimeUnit to apply to delay values. **(TimeUnit, default: <none>, possible values: `NANOSECONDS`,`MICROSECONDS`,`MILLISECONDS`,`SECONDS`,`MINUTES`,`HOURS`,`DAYS`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar time-source.jar
```

2.20 Trigger Source

This app sends trigger based on a fixed delay, date or cron expression. A payload which is evaluated using SpEL can also be sent each time the trigger fires.

Input

N/A

Output

Headers:

Payload:

- Any

Options

The **trigger** source has the following options:

trigger.cron
: Cron expression value for the Cron Trigger. **(String, default: <none>)**

trigger.date-format
: Format for the date value. **(String, default: <none>)**

trigger.fixed-delay
: Fixed delay for periodic triggers. **(Integer, default: `1`)**

trigger.initial-delay
: Initial delay for periodic triggers. **(Integer, default: `0`)**

trigger.max-messages
: Maximum messages per poll, -1 means infinity. **(Long, default: `1`)**

trigger.source.payload
: The expression for the payload of the Source module. **(Expression, default: <none>)**

trigger.time-unit
: The TimeUnit to apply to delay values. **(TimeUnit, default: <none>, possible values: `NANOSECONDS`,`MICROSECONDS`,`MILLISECONDS`,`SECONDS`,`MINUTES`,`HOURS`,`DAYS`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar trigger_source.jar --trigger.source.payload=payload-expression
```

2.21 TriggerTask Source

The TriggerTask app sends a `TaskLaunchRequest` based on a fixed delay, date or cron expression. The `TaskLaunchRequest` is used by a tasklauncher-* sink that will deploy and launch a task. The only required property for the triggertask is the --uri which specifies the artifact that will be launched by the tasklauncher-* that you have selected. The user is also allowed to set the command line arguments as well as the Spring Boot properties that are used by the task.

Input

N/A

Output

Headers:

- `Content-Type: application/octet-stream`

Payload:

A byte array containing the `TaskLaunchRequest`

Options

The **triggertask** source has the following options:

trigger.cron
: Cron expression value for the Cron Trigger. **(String, default: <none>)**

trigger.date-format
: Format for the date value. **(String, default: <none>)**

trigger.fixed-delay
: Fixed delay for periodic triggers. **(Integer, default: `1`)**

trigger.initial-delay
: Initial delay for periodic triggers. **(Integer, default: `0`)**

trigger.max-messages
: Maximum messages per poll, -1 means infinity. **(Long, default: `1`)**

trigger.source.payload
: The expression for the payload of the Source module. **(Expression, default: <none>)**

trigger.time-unit
: The TimeUnit to apply to delay values. **(TimeUnit, default: <none>, possible values: `NANOSECONDS`,`MICROSECONDS`,`MILLISECONDS`,`SECONDS`,`MINUTES`,`HOURS`,`DAYS`)**

triggertask.application-name
: The name to be applied to the launched task.. **(String, default: `<empty string>`)**

triggertask.command-line-args
: Space delimited key=value pairs to be used as commandline variables for the task. **(String, default: `<empty string>`)**

triggertask.deployment-properties
: Comma delimited key=value pairs to be used as deploymentProperties for the task. **(String, default: `<empty string>`)**

triggertask.environment-properties
: Comma delimited key=value pairs to be used as environmentProperties for the task. **(String, default: `<empty string>`)**

triggertask.uri
: The uri to the task artifact. **(String, default: `<empty string>`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar trigger_task.jar --triggertask.uri=maven://org.springframework.cloud.task.app:timestamp-
task:1.2.0.RELEASE
```

2.22 Twitter Stream Source

This source ingests data from Twitter's streaming API. It uses the sample and filter stream endpoints rather than the full "firehose" which needs special access. The endpoint used will depend on the parameters you supply in the stream definition (some are specific to the filter endpoint).

You need to supply all keys and secrets (both consumer and accessToken) to authenticate for this source, so it is easiest if you just add these as the following environment variables: CONSUMER_KEY, CONSUMER_SECRET, ACCESS_TOKEN and ACCESS_TOKEN_SECRET.

Input

N/A

Output

Headers

- `Content-Type: text/plain`

Payload

- `String`

Options

The **twitterstream** source has the following options:

twitter.credentials.access-token
: Access token **(String, default: <none>)**

twitter.credentials.access-token-secret
: Access token secret **(String, default: <none>)**

twitter.credentials.consumer-key
: Consumer key **(String, default: <none>)**

twitter.credentials.consumer-secret
: Consumer secret **(String, default: <none>)**

twitter.stream.follow
: A comma separated list of user IDs, indicating the users to return statuses for in the stream. **(String, default: <none>)**

twitter.stream.language
: The language of the tweet text. **(String, default: <none>)**

twitter.stream.locations
: A set of bounding boxes to track. **(String, default: <none>)**

twitter.stream.stream-type
: Twitter stream type (such as sample, firehose). Default is sample. **(TwitterStreamType, default: <none>, possible values: `SAMPLE`,`FIREHOSE`,`FILTER`)**

twitter.stream.track
: Keywords to track. **(String, default: <none>)**

Note

`twitterstream` emit JSON in the native Twitter format.

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar twitter_stream_source.jar --twitter.credentials.consumerKey=<CONSUMER_KEY> --
twitter.credentials.consumerSecret=<CONSUMER_SECRET> \
    --twitter.credentials.accessToken=<ACCESS_TOKEN> --
twitter.credentials.accessTokenSecret=<ACCESS_TOKEN_SECRET>
```

3. Processors

3.1 Aggregator Processor

Use the `aggregator` application to combine multiple messages into one, based on some correlation mechanism.

This processor is fully based on the Aggregator component from Spring Integration. So, please, consult there for use-cases and functionality.

Input

Headers

If the aggregation and correlation logic is based on the default strategies, the `correlationId`, `sequenceNumber` and `sequenceSize` headers must be presented in the incoming message.

Payload

Aggregator Processor is fully based on the Spring Integration's `AggregatingMessageHandler` and since correlation and aggregation logic don't require particular types, the input payload can be anything able to be transferred over the network and Spring Cloud Stream Binder. If payload is JSON, the `JsonPropertyAccessor` helps to build straightforward SpEL expressions for correlation, release and aggregation functions.

Output

Headers

Returns all headers of the incoming messages that have no conflicts among the group. An absent header on one or more messages within the group is not considered a conflict.

Payload

By default the `DefaultAggregatingMessageGroupProcessor` is used for aggregation function with meaning return the `java.util.List` of payloads of incoming messages. The custom `aggregation` SpEL expression may produce any required object to be sent to the output of the processor.

Options

The **aggregator** processor has the following options:

aggregator.aggregation
: SpEL expression for aggregation strategy. Default is collection of payloads **(Expression, default: <none>)**

aggregator.correlation
: SpEL expression for correlation key. Default to correlationId header **(Expression, default: <none>)**

aggregator.group-timeout
: SpEL expression for timeout to expiring uncompleted groups **(Expression, default: <none>)**

aggregator.message-store-entity
Persistence message store entity: table prefix in RDBMS, collection name in MongoDb, etc **(String, default: <none>)**

aggregator.message-store-type
Message store type **(String, default: <none>)**

aggregator.release
SpEL expression for release strategy. Default is based on the sequenceSize header **(Expression, default: <none>)**

spring.data.mongodb.authentication-database
Authentication database name. **(String, default: <none>)**

spring.data.mongodb.database
Database name. **(String, default: <none>)**

spring.data.mongodb.field-naming-strategy
Fully qualified name of the FieldNamingStrategy to use. **(Class<?>, default: <none>)**

spring.data.mongodb.grid-fs-database
GridFS database name. **(String, default: <none>)**

spring.data.mongodb.host
Mongo server host. Cannot be set with URI. **(String, default: <none>)**

spring.data.mongodb.password
Login password of the mongo server. Cannot be set with URI. **(Character[], default: <none>)**

spring.data.mongodb.port
Mongo server port. Cannot be set with URI. **(Integer, default: <none>)**

spring.data.mongodb.uri
Mongo database URI. Cannot be set with host, port and credentials. **(String, default: `mongodb://localhost/test`)**

spring.data.mongodb.username
Login user of the mongo server. Cannot be set with URI. **(String, default: <none>)**

spring.datasource.continue-on-error
Whether to stop if an error occurs while initializing the database. **(Boolean, default: `false`)**

spring.datasource.data
Data (DML) script resource references. **(List<String>, default: <none>)**

spring.datasource.data-password
Password of the database to execute DML scripts (if different). **(String, default: <none>)**

spring.datasource.data-username
Username of the database to execute DML scripts (if different). **(String, default: <none>)**

spring.datasource.driver-class-name
Fully qualified name of the JDBC driver. Auto-detected based on the URL by default. **(String, default: <none>)**

spring.datasource.generate-unique-name
Whether to generate a random datasource name. **(Boolean, default: `false`)**

spring.datasource.initialization-mode
Initialize the datasource with available DDL and DML scripts. **(DataSourceInitializationMode, default: `embedded`, possible values: `ALWAYS`,`EMBEDDED`,`NEVER`)**

spring.datasource.jndi-name
JNDI location of the datasource. Class, url, username & password are ignored when set. **(String, default: <none>)**

spring.datasource.name
Name of the datasource. Default to "testdb" when using an embedded database. **(String, default: <none>)**

spring.datasource.password
Login password of the database. **(String, default: <none>)**

spring.datasource.platform
Platform to use in the DDL or DML scripts (such as schema-${platform}.sql or data-${platform}.sql). **(String, default: `all`)**

spring.datasource.schema
Schema (DDL) script resource references. **(List<String>, default: <none>)**

spring.datasource.schema-password
Password of the database to execute DDL scripts (if different). **(String, default: <none>)**

spring.datasource.schema-username
Username of the database to execute DDL scripts (if different). **(String, default: <none>)**

spring.datasource.separator
Statement separator in SQL initialization scripts. **(String, default: `;`)**

spring.datasource.sql-script-encoding
SQL scripts encoding. **(Charset, default: <none>)**

spring.datasource.type
Fully qualified name of the connection pool implementation to use. By default, it is auto-detected from the classpath. **(Class<DataSource>, default: <none>)**

spring.datasource.url
JDBC URL of the database. **(String, default: <none>)**

spring.datasource.username
Login username of the database. **(String, default: <none>)**

spring.mongodb.embedded.features
Comma-separated list of features to enable. Uses the defaults of the configured version by default. **(Set<Feature>, default: `[sync_delay]`)**

spring.mongodb.embedded.version
Version of Mongo to use. **(String, default: `3.5.5`)**

spring.redis.database
Database index used by the connection factory. **(Integer, default: `0`)**

spring.redis.host
Redis server host. **(String, default: `localhost`)**

spring.redis.password
Login password of the redis server. **(String, default: <none>)**

spring.redis.port
Redis server port. **(Integer, default: `6379`)**

spring.redis.ssl
Whether to enable SSL support. **(Boolean, default: `false`)**

spring.redis.timeout
Connection timeout. **(Duration, default: <none>)**

spring.redis.url
Connection URL. Overrides host, port, and password. User is ignored. Example: redis://user:password@example.com:6379 **(String, default: <none>)**

By default the `aggregator` processor uses: - `HeaderAttributeCorrelationStrategy(IntegrationMessageHeaderAccessor.CORRELATION_ID)` - for `correlation`; - `SequenceSizeReleaseStrategy` - for `release`; - `DefaultAggregatingMessageGroupProcessor` - for `aggregation`; - `SimpleMessageStore` - for `messageStoreType`.

The `aggregator` application can be configured for persistent `MessageGroupStore` implementations. The configuration for target technology is fully based on the Spring Boot auto-configuration. But default JDBC, MongoDb and Redis auto-configurations are excluded. They are `@Import` ed basing on the `aggregator.messageStoreType` configuration property. Consult Spring Boot Reference Manual for auto-configuration for particular technology you use for `aggregator`.

The JDBC `JdbcMessageStore` requires particular tables in the target data base. You can find schema scripts for appropriate RDBMS vendors in the `org.springframework.integration.jdbc` package of the `spring-integration-jdbc` jar. Those scripts can be used for automatic data base initialization via Spring Boot.

For example:

```
java -jar aggregator-rabbit-1.0.0.RELEASE.jar
               --aggregator.message-store-type=jdbc
               --spring.datasource.url=jdbc:h2:mem:test
               --spring.datasource.schema=org/springframework/integration/jdbc/schema-h2.sql
```

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar aggregator_processor.jar
               --aggregator.message-store-type=jdbc
               --spring.datasource.url=jdbc:h2:mem:test
               --spring.datasource.schema=org/springframework/integration/jdbc/schema-h2.sql

java -jar aggregator_processor.jar
               --spring.data.mongodb.port=0
               --aggregator.correlation=T(Thread).currentThread().id
               --aggregator.release="!#this.?[payload == 'bar'].empty"
               --aggregator.aggregation="#this.?[payload == 'foo'].![payload]"
               --aggregator.message-store-type=mongodb
               --aggregator.message-store-entity=aggregatorTest
```

Code of Conduct

This project adheres to the Contributor Covenant code of conduct. By participating, you are expected to uphold this code. Please report unacceptable behavior to spring-code-of-conduct@pivotal.io.

3.2 Bridge Processor

A Processor module that returns messages that is passed by connecting just the input and output channels.

Input

Headers

Payload

Any

Output

Headers

Payload

Any

Options

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar bridge-processor.jar
```

3.3 Counter Processor

Pass-Through Processor that computes multiple Counters from the messages that pass through. The input messages are re-send unchanged! Using the Micrometer library the Counter Processor integrates with the popular TSDB for persisting and processing the counter values.

By default the Counter Processor increments the `message.name` counter on every received message. The `message-counter-enabled` controls the behavior of the message counter.

If tag expressions are provided (via the `counter.tag.expression.<tagKey>=<tagValue SpEL expression> property) then the `name` counter is incremented. Every SpEL expression may evaluate into multiple values causing multiple counter increments for the same message (one fore every value resolved).

If `fixed tags` are provided they are include in all message and expression counters.

Counter's implementation is based on the Micrometer library which is a Vendor-neutral application metrics facade that supports the most popular monitoring systems. See the Micrometer documentation for the list of supported monitoring systems. Starting with Spring Boot 2.0, Micrometer is the instrumentation library powering the delivery of application metrics from Spring Boot.

All Spring Cloud Stream App Starters are configured to support two of the most popular monitoring systems, Prometheus and InfluxDB. You can declaratively select which monitoring system to use. If you are not using Prometheus or InfluxDB, you can customise the App starters to use a different monitoring system as well as include your preferred micrometer monitoring system library in your own custom applications.

Grafana is a popular platform for building visualization dashboards.

To enable Micrometer's Prometheus meter registry for Spring Cloud Stream application starters, set the following properties.

```
management.metrics.export.prometheus.enabled=true
management.endpoints.web.exposure.include=prometheus
```

and disable the application's security which allows for a simple Prometheus configuration to scrape counter information by setting the following property.

```
spring.cloud.streamapp.security.enabled=false
```

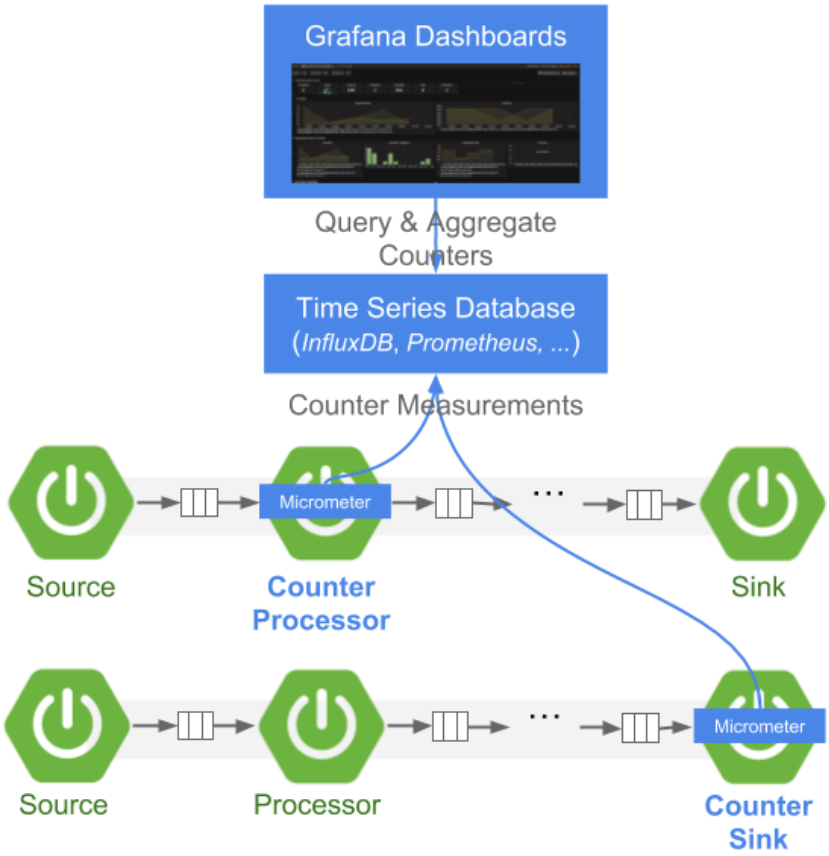
To enable Micrometer's Influx meter registry for Spring Cloud Stream application starters, set the following property.

```
management.metrics.export.influx.enabled=true
management.metrics.export.influx.uri={influxdb-server-url}
```

Note

if the Data Flow Server metrics is enabled then the `Counter` will reuse the exiting configurations.

Following diagram illustrates Counter's information collection and processing flow.



Options

counter.message-counter-enabled
: Enables counting the number of messages processed. Uses the 'message.' counter name prefix to distinct it form the expression based counter. The message counter includes the fixed tags when provided. **(Boolean, default: `true`)**

counter.name
: The name of the counter to increment. **(String, default: <none>)**

counter.name-expression
: A SpEL expression (against the incoming Message) to derive the name of the counter to increment. **(Expression, default: <none>)**

counter.tag.expression
: Computes tags from SpEL expression. Single SpEL expression can produce an array of values, which in turn means distinct name/value tags. Every name/value tag will produce a separate counter increment. Tag expression format is: counter.tag.expression.[tag-name]=[SpEL expression] **(Map<String, Expression>, default: <none>)**

counter.tag.fixed
: Custom tags assigned to every counter increment measurements. This is a map so the property convention fixed tags is: counter.tag.fixed.[tag-name]=[tag-value] **(Map<String, String>, default: <none>)**

3.4 Filter Processor

Use the filter module in a stream to determine whether a Message should be passed to the output channel.

Input

Headers

N/A

Payload

Any

Output

Headers

N/A

Payload

Any

Options

The **filter** processor has the following options:

filter.expression
: A SpEL expression to be evaluated against each message, to decide whether or not to accept it. **(Expression, default: `true`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar filter-processor.jar --expression="payload"
```

3.5 Groovy Filter Processor

A Processor application that retains or discards messages according to a predicate, expressed as a Groovy script.

Input

Headers

N/A

Payload

- Any

Output

Headers

N/A

Payload

- Any

Options

The **groovy-filter** processor has the following options:

groovy-filter.script
: The resource location of the groovy script **(Resource, default: <none>)**

groovy-filter.variables
: Variable bindings as a new line delimited string of name-value pairs, e.g. 'foo=bar\n baz=car'. **(Properties, default: <none>)**

groovy-filter.variables-location
: The location of a properties file containing custom script variable bindings. **(Resource, default: <none>)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar groovy-filter-processor.jar --script=script.groovy
```

3.6 Groovy Transform Processor

A Processor module that transforms messages using a Groovy script.

Input

Headers

N/A

Payload

- Any

Output

Headers

N/A

Payload

- Any

Options

The **groovy-transform** processor has the following options:

groovy-transformer.script
: Reference to a script used to process messages. **(Resource, default: <none>)**

groovy-transformer.variables
: Variable bindings as a new line delimited string of name-value pairs, e.g. 'foo=bar\n baz=car'. **(Properties, default: <none>)**

groovy-transformer.variables-location
: The location of a properties file containing custom script variable bindings. **(Resource, default: <none>)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar groovy-transform-processor.jar --script=script.groovy
```

3.7 gRPC Processor

This processor uses gRPC to process Messages via a remote process written in any language that supports gRPC. This pattern, allows the Java app to handle the stream processing while the gRPC service handles the business logic. The service must implement the grpc service using link:. ./grpc-app-protos/src/main/proto/processor.proto[this protobuf schema].

Note

The gRPC client stub is blocking by default. Asynchronous and streaming stubs are provided. The Asynchronous stub will perform better if the server is multi-threaded however message ordering will not be guaranteed. If the server supports bidirectional streaming, use the streaming stub.

Note

A `riff` stub is available for interoperability with riff function containers. This does not interact with the Riff FaaS platform but supports running an existing function container standalone, for example, `docker run -it -p10382:10382 some/riff-function:latest` .

Input

Headers

Headers are available to the sidecar application via the process schema if `grpc.include-headers` is `true`. The header value contains one or more string values to support multiple values, e.g., the HTTP `Accepts` header.

Payload

The payload is a byte array as defined by the schema.

Output

Headers

In most cases the return message should simply contain the original headers provided. The sidecar application may modify or add headers however it is recommended to only add headers if necessary.

Payload

It is expected that the payload will normally be a string or byte array. However common primitive types are supported as defined by the schema.

Options

The **grpc** processor has the following options:

grpc.host
: The gRPC host name. **(String, default: <none>)**

grpc.idle-timeout
: The idle timeout in seconds. **(Long, default: `0`)**

grpc.include-headers
: Flag to include headers in Messages to the remote process. **(Boolean, default: `false`)**

grpc.max-message-size
: The maximum message size (bytes). **(Integer, default: `0`)**

grpc.plain-text
: Flag to send messages in plain text. SSL configuration required otherwise. **(Boolean, default: `true`)**

grpc.port
: The gRPC server port. **(Integer, default: `0`)**

grpc.stub
: RPC communications style (default 'blocking'). **(Stub, default: <none>, possible values: `async`,`blocking`,`streaming`,`riff`)**

3.8 Header Enricher Processor

Use the header-enricher app to add message headers.

The headers are provided in the form of new line delimited key value pairs, where the keys are the header names and the values are SpEL expressions. For example `--headers='foo=payload.someProperty \n bar=payload.otherProperty'`

Input

Headers

N/A

Payload

- Any

Output

Headers

N/A

Payload

- Any

Options

The **header-enricher** processor has the following options:

header.enricher.headers
: \n separated properties representing headers in which values are SpEL expressions, e.g foo='bar' \n baz=payload.baz **(Properties, default: <none>)**

header.enricher.overwrite
: set to true to overwrite any existing message headers **(Boolean, default: `false`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar header-enricher-processor.jar --headers='foo=payload.someProperty \n
 bar=payload.otherProperty'
```

Code of Conduct

This project adheres to the Contributor Covenant code of conduct. By participating, you are expected to uphold this code. Please report unacceptable behavior to spring-code-of-conduct@pivotal.io.

3.9 Http Client Processor

A processor app that makes requests to an HTTP resource and emits the response body as a message payload. This processor can be combined, e.g., with a time source app to periodically poll results from a HTTP resource.

Input

Headers

Any Required HTTP headers must be explicitly set via the `headers-expression` property. See examples below. Header values may also be used to construct the request body when referenced in the `body-expression` property.

Payload

You can set the `http-method-expression` property to derive the HTTP method from the inbound Message, or `http-method` to set it statically (defaults to GET method). The Message payload may be any Java type. Generally, standard Java types such as String(e.g., JSON, XML) or byte array payloads are recommended. A Map should work without too much effort. By default, the payload will become HTTP request body (if needed). You may also set the `body-expression` property to construct a value derived from the Message, or `body` to use a static (literal) value.

Internally, the processor uses RestTemplate.exchange(…).

The RestTemplate supports Jackson JSON serialization to support any request and response types if necessary. The `expected-response-type` property, `String.class` by default, may be set to any class in your application class path. (Note user defined payload types will require adding required dependencies to your pom file)

Output

Headers

No HTTP message headers are mapped to the outbound Message.

Payload

The raw output object is ResponseEntity<?> any of its fields (e.g., `body`, `headers`) or accessor methods (`statusCode`) may be referenced as part of the `reply-expression`. By default the outbound Message payload is the response body.

Options

The **httpclient** processor has the following options:

httpclient.body
: The (static) request body; if neither this nor bodyExpression is provided, the payload will be used. **(Object, default: <none>)**

httpclient.body-expression
: A SpEL expression to derive the request body from the incoming message. **(Expression, default: <none>)**

httpclient.expected-response-type
: The type used to interpret the response. **(Class<?>, default: <none>)**

httpclient.headers-expression
: A SpEL expression used to derive the http headers map to use. **(Expression, default: <none>)**

httpclient.http-method
: The kind of http method to use. **(HttpMethod, default: <none>, possible values: `GET`,`HEAD`,`POST`,`PUT`,`PATCH`,`DELETE`,`OPTIONS`,`TRACE`)**

httpclient.http-method-expression
: A SpEL expression to derive the request method from the incoming message. **(Expression, default: <none>)**

httpclient.reply-expression
: A SpEL expression used to compute the final result, applied against the whole http response. **(Expression, default: body)**

httpclient.url
: The URL to issue an http request to, as a static value. **(String, default: <none>)**

httpclient.url-expression
: A SpEL expression against incoming message to determine the URL to use. **(Expression, default: <none>)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
$ java -jar httpclient-processor.jar --httpclient.url=http://someurl  --httpclient.http-method=POST --
httpclient.headers-expression="{'Content-Type':'application/json'}"

$ java -jar httpclient-processor.jar --httpclient.url=http://someurl  --httpclient.reply-
expression="statusCode.name()"
```

3.10 PMML Processor

A processor that evaluates a machine learning model stored in PMML format.

Input

Headers

N/A

Payload

- `PMML model data`

Output

Headers

N/A

Payload

- `Tuple carrying information about the evaluated data`

Options

The **pmml** processor has the following options:

pmml.inputs
: How to compute model active fields from input message properties as modelField->SpEL. **(Map<String, Expression>, default: <none>)**

pmml.model-location
: The location of the PMML model file. **(Resource, default: <none>)**

pmml.model-name
: If the model file contains multiple models, the name of the one to use. **(String, default: <none>)**

pmml.model-name-expression
: If the model file contains multiple models, the name of the one to use, as a SpEL expression. **(Expression, default: <none>)**

pmml.outputs
: How to emit evaluation results in the output message as msgProperty->SpEL. **(Map<String, Expression>, default: <none>)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar pmml-processor.jar --pmml.modelLocation= --pmml.modelName="
java -jar pmml-processor.jar --pmml.modelLocation= --pmml.modelNameExpression="
```

3.11 Python Http Processor

Spring Cloud Stream App Starters for integrating with python

This application invokes a REST service, using httpclient processor. As a convenience for Python developers, this processor allows you to provide a Jython wrapper script that may execute a function before and after REST call in order to perform any necessary data transformation. If you don't require any custom transformations, just use the httpclient processor.

The diagram shows input and output adapters as conceptual components. These are actually implemented as functions defined in a single script that must conform to a simple convention:

```
def input():
    return "Pre" + payload;

def output():
    return payload + "Post";

result = locals()[channel]()
```

The function names `input` and `output` map to the conventional channel names used by Spring Cloud Stream processors. The last line is a bit of Python reflection magic to invoke a function by its name, given by the bound variable `channel`. Implemented with Spring Integration Scripting, `headers` and `payload` are always bound to the Message headers and payload respectively. The payload on the `input` side is the object you use to build the REST request. The `output` side transforms the response. If you don't need any additional processing on one side, implement the function with `pass` as the body:

```
def output():
   pass
```

Note

The last line in the script must be an assignment statement. The variable name doesn't matter. This is required to bind the return value correctly.

Note

The script is evaluated for every message. This tends to create a a lot of classes for each execution which puts stress on the JRE `Metaspace` memory region (or `Permgen` if using a JRE prior to version 8). In Java 8, Metaspace is unlimited by default, allocated from native memory, and therefore limited by the native OS. If deploying to CloudFoundry, the Java Buildpack Memory Calculator sets `-XXMaxMetaspaceSize`. (see github.com/cloudfoundry/java-buildpack-memory-calculator for details). If using JBP v4.x, you may override the calculated value (and others) by specifying `-XXMaxMetaspaceSize` explicitly in `JAVA_OPTS`. You also need to increase the container memory accordingly. Similar tuning is advised in any containerized environment.

Input

Headers

Headers will be bound automatically to the wrapper script variable `headers`.

Payload

Any type. Payload will be automatically bound to the wrapper script variable `payload`. Jython scripts can effectively access any Java type on the app's classpath.

Output

Headers

Headers may be set by the Jython wrapper script if the `output()` script function returns a Message.

Payload

Whatever the `output()`wrapper script function returns.

Note

The wrapper script is intended to perform some required transformations prior to sending an HTTP request and/or after the response is received. The return value of the input adapter will be the inbound payload of the httpclient processor and shoud conform to its requirements. Likewise the HTTP `reply-expression` will bound to be the payload when the `output()` function is invoked.

Options

The **python-http** processor has the following options:

git.basedir
: The base directory where the repository should be cloned. If not specified, a temporary directory will be created. **(File, default: <none>)**

git.clone-on-start
: Flag to indicate that the repository should be cloned on startup (not on demand). Generally leads to slower startup but faster first query. **(Boolean, default: `true`)**

git.label
: The label or branch to clone. **(String, default: `master`)**

git.passphrase
: The passphrase for the remote repository. **(String, default: <none>)**

git.password
: The password for the remote repository. **(String, default: <none>)**

git.timeout
: Timeout (in seconds) for obtaining HTTP or SSH connection (if applicable). Default 5 seconds. **(Integer, default: 5)**

git.uri
: The URI of the remote repository. **(String, default: <none>)**

git.username
: The username for the remote repository. **(String, default: <none>)**

httpclient.body
: The (static) request body; if neither this nor bodyExpression is provided, the payload will be used. **(Object, default: <none>)**

httpclient.body-expression
: A SpEL expression to derive the request body from the incoming message. **(Expression, default: <none>)**

httpclient.expected-response-type
: The type used to interpret the response. **(Class<?>, default: <none>)**

httpclient.headers-expression
: A SpEL expression used to derive the http headers map to use. **(Expression, default: <none>)**

httpclient.http-method
: The kind of http method to use. **(HttpMethod, default: <none>, possible values: `GET`,`HEAD`,`POST`,`PUT`,`PATCH`,`DELETE`,`OPTIONS`,`TRACE`)**

httpclient.http-method-expression
: A SpEL expression to derive the request method from the incoming message. **(Expression, default: <none>)**

httpclient.reply-expression
: A SpEL expression used to compute the final result, applied against the whole http response. **(Expression, default: body)**

httpclient.url
: The URL to issue an http request to, as a static value. **(String, default: <none>)**

httpclient.url-expression
: A SpEL expression against incoming message to determine the URL to use. **(Expression, default: <none>)**

wrapper.content-type
: Sets the Content type header for the outgoing Message. **(MediaType, default: <none>)**

wrapper.delimiter
: The variable delimiter. **(Delimiter, default: <none>, possible values: `COMMA`,`SPACE`,`TAB`,`NEWLINE`)**

wrapper.script
: The Python script file name. **(String, default: <none>)**

wrapper.variables
: Variable bindings as a delimited string of name-value pairs, e.g. 'foo=bar,baz=car'. **(String, default: <none>)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

See httpclient processor for more examples on `httpclient` properties.

```
$java -jar python-http-processor.jar --wrapper.script=/local/directory/build-json.py --
httpclient.url=http://someurl
--httpclient.http-method=POST --httpclient.headers-expression="{'Content-Type':'application/json'}"

$java -jar python-http-processor.jar --git.uri=https://github.com/some-repo --wrapper.script=some-
script.py --wrapper
.variables=foo=0.45,bar=0.55 --httpclient.url=http://someurl
```

3.12 Jython Processor

This application executes a Jython script that binds `payload` and `headers` variables to the Message payload and headers respectively. In addition you may provide a `jython.variables` property containing a (comma delimited by default) delimited string, e.g., `var1=val1,var2=val2,...`.

This processor uses a JSR-223 compliant embedded ScriptEngine provided by www.jython.org/.

Note

The last line in the script must be an assignment statement. The variable name doesn't matter. This is required to bind the return value correctly.

Note

The script is evaluated for every message which may limit your performance with high message loads. This also tends to create a a lot of classes for each execution which puts stress on the JRE `Metaspace` memory region (or `Permgen` if using a JRE prior to version 8). In Java 8, Metaspace is unlimited by default, allocated from native memory, and therefore limited by the native OS. If deploying to CloudFoundry, the Java Buildpack Memory Calculator sets `-XXMaxMetaspaceSize`. (see github.com/cloudfoundry/java-buildpack-memory-calculator for details). If using JBP v4.x, you may override the calculated value (and others) by specifying `-XXMaxMetaspaceSize` explicitly in `JAVA_OPTS`. You also need to increase the container memory accordingly. Similar tuning is advised in any containerized environment.

Input

Headers

Headers will be bound automatically to the script variable `headers`.

Payload

Any type. Payload will be automatically bound to the script variable `payload`.

Output

Headers

Headers may be set by the Jython script if the script returns a Message.

Payload

Whatever the script returns.

Options

The **jython** processor has the following options:

git.basedir
: The base directory where the repository should be cloned. If not specified, a temporary directory will be created. **(File, default: <none>)**

git.clone-on-start
: Flag to indicate that the repository should be cloned on startup (not on demand). Generally leads to slower startup but faster first query. **(Boolean, default: `true`)**

git.label
: The label or branch to clone. **(String, default: `master`)**

git.passphrase
: The passphrase for the remote repository. **(String, default: <none>)**

git.password
: The password for the remote repository. **(String, default: <none>)**

git.timeout
: Timeout (in seconds) for obtaining HTTP or SSH connection (if applicable). Default 5 seconds. **(Integer, default: 5)**

git.uri
: The URI of the remote repository. **(String, default: <none>)**

git.username
: The username for the remote repository. **(String, default: <none>)**

jython.content-type
: Sets the Content type header for the outgoing Message. **(MediaType, default: <none>)**

jython.delimiter
: The variable delimiter. **(Delimiter, default: <none>, possible values: `COMMA`,`SPACE`,`TAB`,`NEWLINE`)**

jython.script
: The Python script file name. **(String, default: <none>)**

jython.variables
: Variable bindings as a delimited string of name-value pairs, e.g. 'foo=bar,baz=car'. **(String, default: <none>)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
$java -jar python-jython-processor.jar --jython.script=/local/directory/to_uppercase.py

$java -jar python-jython-processor.jar --git.uri=https://github.com/some-repo --jython
.script=map-tweet-sentiments.py --jython.variables=neutral=0.45,positive=0.55
```

3.13 Scripable Transform Processor

A **Spring Cloud Stream** module that transforms messages using a script. The script body is supplied directly as a property value. The language of the script can be specified (groovy/javascript/ruby/python).

Input

Headers

N/A

Payload

- Any

Output

Headers

N/A

Payload

- Any

Options

The **scriptable-transform** processor has the following options:

scriptable-transformer.language
: Language of the text in the script property. Supported: groovy, javascript, ruby, python. **(String, default: <none>)**

scriptable-transformer.script
: Text of the script. **(String, default: <none>)**

scriptable-transformer.variables
: Variable bindings as a new line delimited string of name-value pairs, e.g. 'foo=bar\n baz=car'. **(Properties, default: <none>)**

scriptable-transformer.variables-location
: The location of a properties file containing custom script variable bindings. **(Resource, default: <none>)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then `cd` into one one of the folders and build it:

```
$ ./mvnw clean package
```

Folder `target` will then contain generated jars (*original*, *repackaged* also known as ***executable*** *jar*, with *javadoc*, etc.) of which the *executable* jar can be used directly with `java` to run the application.

Name of executable jar follows the pattern: `scriptable-transform-processor-`**`BINDER`**`-`**`VERSION`**`.jar`

Examples

Starting from top-level folder, assuming you target rabbitmq and your `pom.xml` has `2.1.0.RELEASE` for the `project.version` property, you can build and run the standalone application with :

```
$ ./mvnw clean install -PgenerateApps
$ cd apps/scriptable-transform-processor-rabbit
$ ./mvnw clean package
$ java -jar target/scriptable-transform-processor-rabbit-2.1.0.RELEASE.jar --scriptable-
transformer.language=ruby --scriptable-transformer.script="return ""#{payload.upcase}"""
```

3.14 Splitter Processor

The splitter app builds upon the concept of the same name in Spring Integration and allows the splitting of a single message into several distinct messages.

Input

Headers

N/A

Payload

- Any

Output

Headers

N/A

Payload

- A collection of split messages based on a given expression, delimiter or file marker.

Options

splitter.apply-sequence
: Add correlation/sequence information in headers to facilitate later aggregation. **(Boolean, default: `true`)**

splitter.charset
: The charset to use when converting bytes in text-based files to String. **(String, default: <none>)**

splitter.delimiters
: When expression is null, delimiters to use when tokenizing {@link String} payloads. **(String, default: <none>)**

splitter.expression
: A SpEL expression for splitting payloads. **(Expression, default: <none>)**

splitter.file-markers
: Set to true or false to use a {@code FileSplitter} (to split text-based files by line) that includes (or not) beginning/end of file markers. **(Boolean, default: <none>)**

splitter.markers-json
: When 'fileMarkers == true', specify if they should be produced as FileSplitter.FileMarker objects or JSON. **(Boolean, default: `true`)**

When no `expression`, `fileMarkers`, or `charset` is provided, a `DefaultMessageSplitter` is configured with (optional) `delimiters`. When `fileMarkers` or `charset` is provided, a `FileSplitter` is configured (you must provide either a `fileMarkers` or `charset` to split files, which must be text-based - they are split into lines). Otherwise, an `ExpressionEvaluatingMessageSplitter` is configured.

When splitting `File` payloads, the `sequenceSize` header is zero because the size cannot be determined at the beginning.

Caution

Ambiguous properties are not allowed.

JSON Example

As part of the SpEL expression you can make use of the pre-registered JSON Path function. The syntax is `#jsonPath(payload, '<json path expression>')`.

For example, consider the following JSON:

```
{ "store": {
    "book": [
        {
            "category": "reference",
            "author": "Nigel Rees",
            "title": "Sayings of the Century",
            "price": 8.95
        },
        {
            "category": "fiction",
            "author": "Evelyn Waugh",
            "title": "Sword of Honour",
            "price": 12.99
        },
        {
            "category": "fiction",
            "author": "Herman Melville",
            "title": "Moby Dick",
            "isbn": "0-553-21311-3",
            "price": 8.99
        },
        {
            "category": "fiction",
            "author": "J. R. R. Tolkien",
            "title": "The Lord of the Rings",
            "isbn": "0-395-19395-8",
            "price": 22.99
        }
    ],
    "bicycle": {
        "color": "red",
        "price": 19.95
    }
}}
```

and an expression `#jsonPath(payload, '$.store.book')`; the result will be 4 messages, each with a `Map` payload containing the properties of a single book.

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar splitter-processor.jar --splitter.expression=expression
java -jar splitter-processor.jar --splitter.delimiters=delimiters
```

3.15 Task Launch Request Transform

Use the task launch request transform in a stream to create a TaskLaunchRequest to be passed to the output channel. The TaskLaunchRequest is used by a TaskLauncher to launch tasks on the platform.

Input

Any input type. (payload and header are discarded)

Output

Headers:

- `Content-Type: application/octet-stream`

Payload:

A byte array containing the `TaskLaunchRequest`

Options

The **tasklaunchrequest** processor has the following options:

task.launch.request.application-name
: The name to be applied to the launched task. **(String, default: `<empty string>`)**

task.launch.request.command-line-arguments
: Space delimited list of commandLineArguments to be applied to the TaskLaunchRequest. **(String, default: <none>)**

task.launch.request.data-source-driver-class-name
: The datasource driver class name to be applied to the TaskLaunchRequest. **(String, default: <none>)**

task.launch.request.data-source-password
: The datasource password to be applied to the TaskLaunchRequest. **(String, default: <none>)**

task.launch.request.data-source-url
: The datasource url to be applied to the TaskLaunchRequest. **(String, default: <none>)**

task.launch.request.data-source-user-name
: The datasource user name to be applied to the TaskLaunchRequest. **(String, default: <none>)**

task.launch.request.deployment-properties
: Comma delimited list of deployment properties to be applied to the TaskLaunchRequest. **(String, default: <none>)**

task.launch.request.environment-properties
: Comma delimited list of environment properties to be applied to the TaskLaunchRequest. **(String, default: <none>)**

task.launch.request.uri
: The uri of the artifact to be applied to the TaskLaunchRequest. **(String, default: <none>)**

Building with Maven

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar tasklaunchrequest_transform_processor.jar --uri=maven://
org.springframework.cloud.task.app:timestamp-task:1.2.0.RELEASE
```

3.16 TCP Client as a processor which connects to a TCP server, sends data to it and also receives data.

Input

Headers:

- `Content-Type: application/octet-stream`

Payload:

- `byte[]`

Headers:

- `Content-Type: text/plain`

Payload:

- `String`

Output

Headers:

- `Content-Type: application/octet-stream`

Payload:

- `byte[]`

Options

The **tcp-client** processor has the following options:

tcp.buffer-size
: The buffer size used when decoding messages; larger messages will be rejected. **(Integer, default: `2048`)**

tcp.charset
: The charset used when converting from bytes to String. **(String, default: `UTF-8`)**

tcp.decoder
: The decoder to use when receiving messages. **(Encoding, default: <none>, possible values: `CRLF`,`LF`,`NULL`,`STXETX`,`RAW`,`L1`,`L2`,`L4`)**

tcp.encoder
: The encoder to use when sending messages. **(Encoding, default: <none>, possible values: `CRLF`,`LF`,`NULL`,`STXETX`,`RAW`,`L1`,`L2`,`L4`)**

tcp.host
: The host to which this sink will connect. **(String, default: `localhost`)**

tcp.nio
: Whether or not to use NIO. **(Boolean, default: `false`)**

tcp.port
: The port on which to listen; 0 for the OS to choose a port. **(Integer, default: `1234`)**

tcp.retry-interval
: Retry interval (in milliseconds) to check the connection and reconnect. **(Long, default: `60000`)**

tcp.reverse-lookup
: Perform a reverse DNS lookup on the remote IP Address; if false, just the IP address is included in the message headers. **(Boolean, default: `false`)**

tcp.socket-timeout
: The timeout (ms) before closing the socket when no data is received. **(Integer, default: `120000`)**

tcp.use-direct-buffers
: Whether or not to use direct buffers. **(Boolean, default: `false`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar tcp-client-processor.jar --tcp.decoder=LF --tcp.encoder=LF
```

3.17 Transform Processor

Use the transform app in a stream to convert a Message's content or structure.

The transform processor is used by passing a SpEL expression. The expression should return the modified message or payload.

As part of the SpEL expression you can make use of the pre-registered JSON Path function. The syntax is #jsonPath(payload,'<json path expression>')

Input

Headers

N/A

Payload

- Any

Output

Headers

N/A

Payload

- Any

Options

The **transform** processor has the following options:

transformer.expression
    <documentation missing> **(Expression, default: `payload`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar transform-processor.jar --expression=payload.toUpperCase()
```

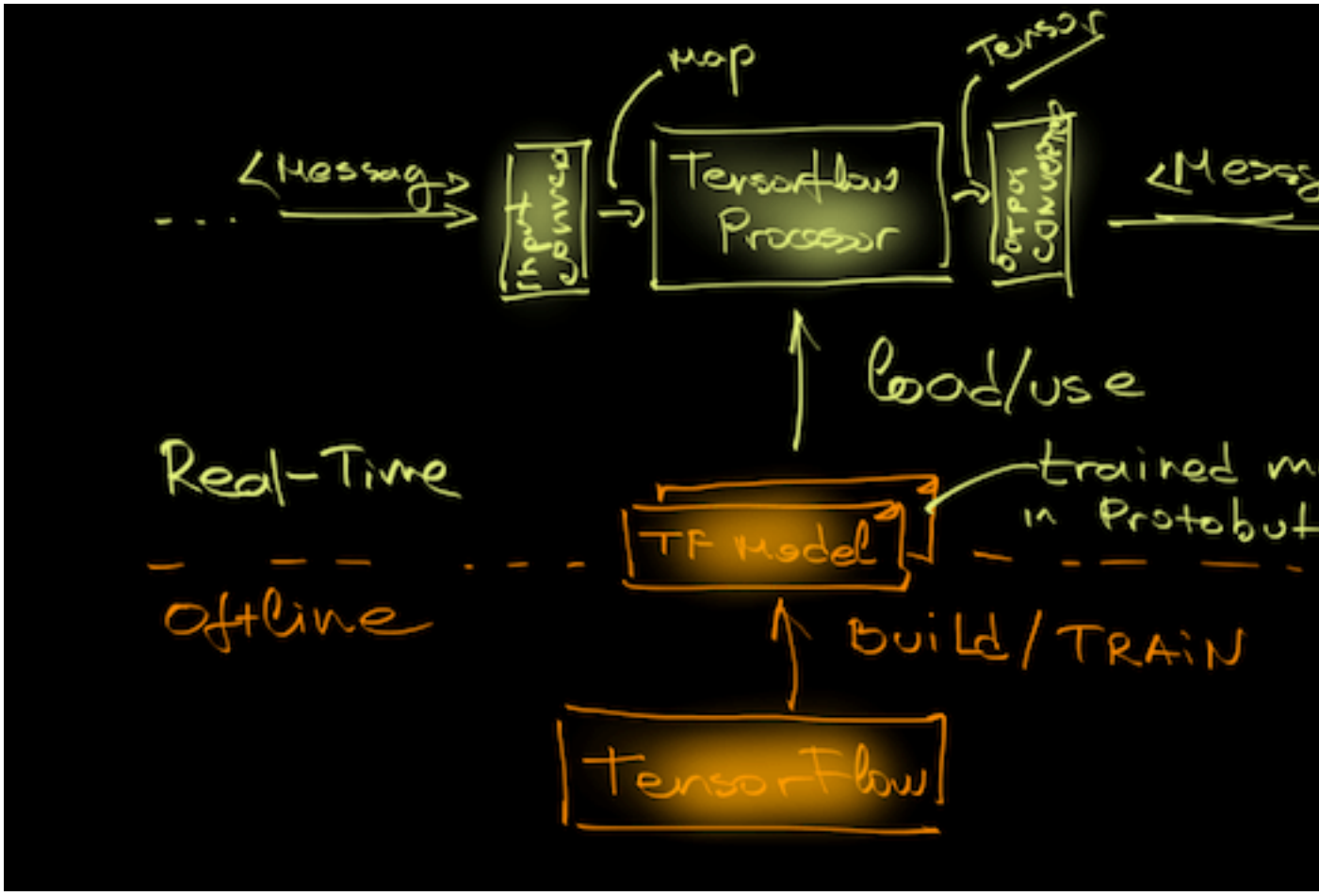
This transform will convert all message payloads to upper case.

3.18 TensorFlow Processor

A processor that evaluates a machine learning model stored in TensorFlow Protobuf format.

Following snippet shows how to export a `TensorFlow` model into `ProtocolBuffer` binary format as required by the Processor.

```
from tensorflow.python.framework.graph_util import convert_variables_to_constants
...
SAVE_DIR = os.path.abspath(os.path.curdir)
minimal_graph = convert_variables_to_constants(sess, sess.graph_def, ['<model output>'])
tf.train.write_graph(minimal_graph, SAVE_DIR, 'my_graph.proto', as_text=False)
tf.train.write_graph(minimal_graph, SAVE_DIR, 'my.txt', as_text=True)
```



The `--tensorflow.model` property configures the Processor with the location of the serialized Tensorflow model.

The `TensorflowInputConverter` converts the input data into the format, specific for the given model.

The `TensorflowOutputConverter` converts the computed `Tensors` result into a pipeline `Message`.

The `--tensorflow.modelFetch` property defines the list of TensorFlow graph outputs to fetch the output Tensors from.

The `--tensorflow.mode` property defines whether the computed results are passed in the message payload or in the message header.

Input

Headers

N/A

Payload

The TensorFlow Processor uses a `TensorflowInputConverter` to convert the input data into data format compliant with the TensorFlow Model used. The input converter converts the input `Messages` into key/value `Map`, where the Key corresponds to a model input placeholder and the content is `org.tensorflow.DataType` compliant value. The default converter implementation expects either Map payload or flat json message that can be converted into a Map.

The `TensorflowInputConverter` can be extended and customized. See TwitterSentimentTensorflowInputConverter.java for example.

Output

Headers

N/A

Payload

Processor's output uses `TensorflowOutputConverter` to convert the computed `Tensor` result into a serializable message. The default implementation uses JSON.

Custom `TensorflowOutputConverter` can provide more convenient data representations. See TwitterSentimentTensorflowOutputConverter.java.

Options

The **tensorflow** processor has the following options:

tensorflow.expression
: How to obtain the input data from the input message. If empty it defaults to the input message payload. The headers[myHeaderName] expression to get input data from message's header using myHeaderName as a key. **(Expression, default: <none>)**

tensorflow.mode
: The outbound message can store the inference result either in the payload or in a header with name outputName. The payload mode (default) stores the inference result in the outbound message payload. The inbound payload is discarded. The header mode stores the inference result in outbound message's header defined by the outputName property. The the inbound message payload is passed through to the outbound such. **(OutputMode, default: <none>, possible values: `payload`,`header`)**

tensorflow.model
: The location of the pre-trained TensorFlow model file. The file, http and classpath schemas are supported. For archive locations takes the first file with '.pb' extension.

Use the URI fragment parameter to specify an exact model name (e.g. https://foo/bar/model.tar.gz#frozen_inference_graph.pb) **(Resource, default: <none>)**

tensorflow.model-fetch
: The TensorFlow graph model outputs. Comma separate list of TensorFlow operation names to fetch the output Tensors from. **(List<String>, default: <none>)**

tensorflow.output-name
: The output data key used for the Header modes. **(String, default: `result`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

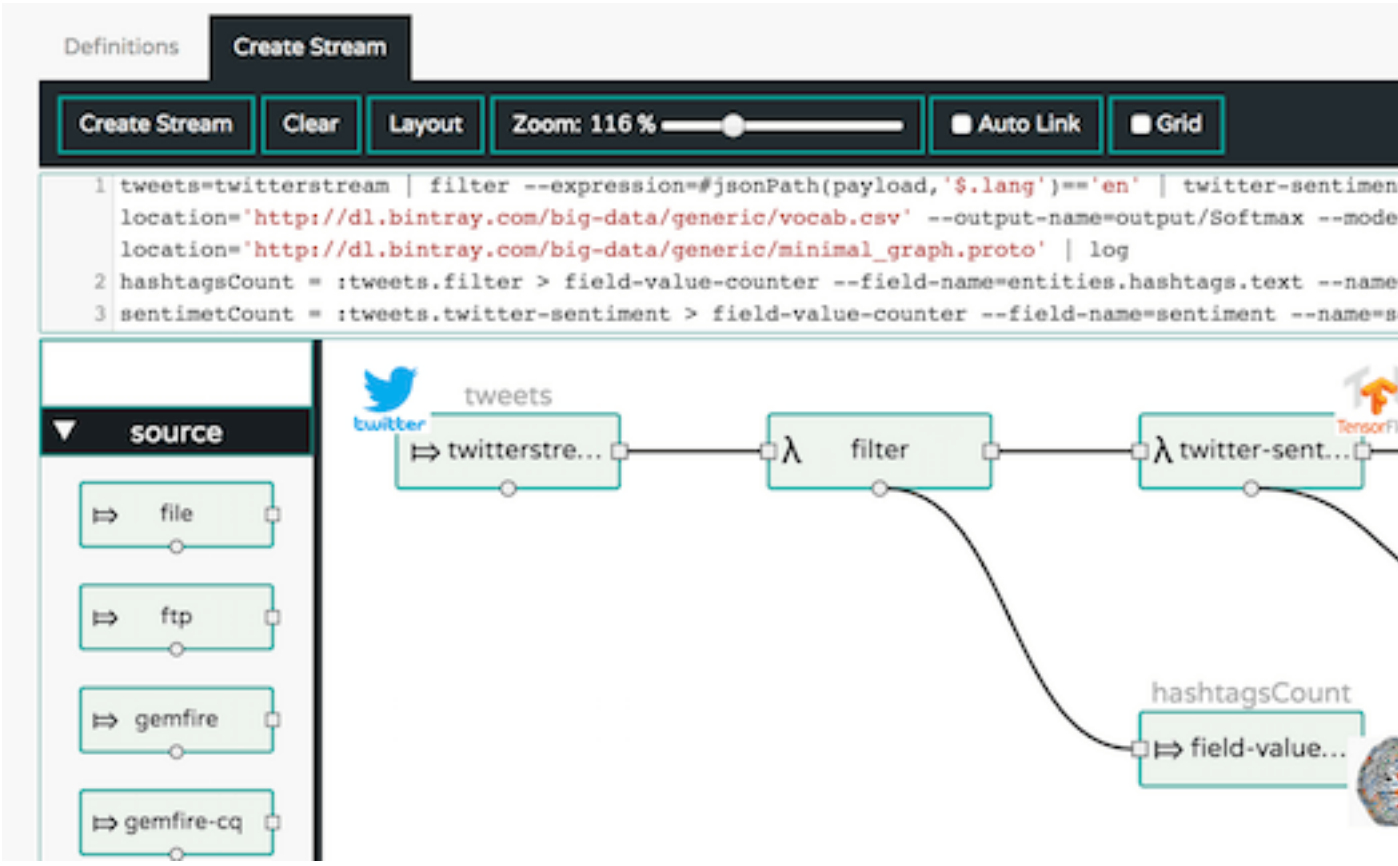
```
$ ./mvnw clean package
```

Examples

```
java -jar tensorflow-processor.jar --model= --modelFetch= --mode="
```

3.19 Twitter Sentiment Analysis Processor

A processor that evaluates a machine learning model stored in TensorFlow Protobuf format. It operationalizes the github.com/danielegrattarola/twitter-sentiment-cnn



Real-time Twitter Sentiment Analytics with TensorFlow and Spring Cloud Dataflow

Input

Headers

- `content-type: application/json`

Payload

- `JSON tweet message`

Output

Headers

- `content-type: application/json`

Payload

Decodes the evaluated result into POSITIVE, NEGATIVE and NEUTRAL values. Then creates and returns a simple JSON message with this structure:

N/A

Payload

Processor's output uses `TensorflowOutputConverter` to convert the computed `Tensor` result into a serializable message. The default implementation uses JSON.

Custom `TensorflowOutputConverter` can provide more convenient data representations. See TwitterSentimentTensorflowOutputConverter.java.

Options

The **twitter-sentiment** processor has the following options:

tensorflow.expression
: How to obtain the input data from the input message. If empty it defaults to the input message payload. The headers[myHeaderName] expression to get input data from message's header using myHeaderName as a key. **(Expression, default: <none>)**

tensorflow.mode
: The outbound message can store the inference result either in the payload or in a header with name outputName. The payload mode (default) stores the inference result in the outbound message payload. The inbound payload is discarded. The header mode stores the inference result in outbound message's header defined by the outputName property. The the inbound message payload is passed through to the outbound such. **(OutputMode, default: <none>, possible values: `payload`,`header`)**

tensorflow.model
: The location of the pre-trained TensorFlow model file. The file, http and classpath schemas are supported. For archive locations takes the first file with '.pb' extension.

Use the URI fragment parameter to specify an exact model name (e.g. https://foo/bar/model.tar.gz#frozen_inference_graph.pb) **(Resource, default: <none>)**

tensorflow.model-fetch
: The TensorFlow graph model outputs. Comma separate list of TensorFlow operation names to fetch the output Tensors from. **(List<String>, default: <none>)**

tensorflow.output-name
: The output data key used for the Header modes. **(String, default: `result`)**

tensorflow.twitter.vocabulary
: The location of the word vocabulary file, used for training the model **(Resource, default: <none>)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar twitter-sentiment-processor.jar --tensorflow.twitter.vocabulary= --tensorflow.model= \
    --tensorflow.modelFetch= --tensorflow.mode="
```

And here is a sample pipeline that computes sentiments for json tweets coming from the `twitterstream` source and using the pre-build `minimal_graph.proto` and `vocab.csv`:

```
tweets=twitterstream --access-token-secret=xxx --access-token=xxx --consumer-secret=xxx --consumer-
key=xxx \
| filter --expression=#jsonPath(payload,'$.lang')=='en' \
| twitter-sentimet --vocabulary='http://dl.bintray.com/big-data/generic/vocab.csv' \
   --output-name=output/Softmax --model='http://dl.bintray.com/big-data/generic/minimal_graph.proto' \
   --model-fetch=output/Softmax \
| log
```

3.20 Image Recognition Processor

A processor that uses an Inception model to classify in real-time images into different categories (e.g. labels).

Model implements a deep Convolutional Neural Network that can achieve reasonable performance on hard visual recognition tasks - matching or exceeding human performance in some domains like image recognition.

The input of the model is an image as binary array.

The output is a JSON message in this format:

```
{
  "labels" : [
     {"giant panda":0.98649305}
  ]
}
```

Result contains the name of the recognized category (e.g. label) along with the confidence (e.g. confidence) that the image represents this category.

If the `response-seize` is set to value higher then 1, then the result will include the top `response-seize` probable labels. For example `response-size=3` would return:

```
{
  "labels": [
    {"giant panda":0.98649305},
    {"badger":0.010562794},
    {"ice bear":0.001130851}
  ]
}
```

Options

The **image-recognition** processor has the following options:

tensorflow.expression
: How to obtain the input data from the input message. If empty it defaults to the input message payload. The headers[myHeaderName] expression to get input data from message's header using myHeaderName as a key. **(Expression, default: <none>)**

tensorflow.image.recognition.draw-labels
: When set to true it augment the input image with the predicted labels **(Boolean, default: `true`)**

tensorflow.image.recognition.labels
: The text file containing the category names (e.g. labels) of all categories that this model is trained to recognize. Every category is on a separate line. **(Resource, default: <none>)**

tensorflow.image.recognition.response-size
: Number of top K alternatives to add to the result. Only used when the responseSize > 0. **(Integer, default: 1)**

tensorflow.mode
: The outbound message can store the inference result either in the payload or in a header with name outputName. The payload mode (default) stores the inference result in the outbound message payload. The inbound payload is discarded. The header mode stores the inference result in outbound message's header defined by the outputName property. The the inbound message payload is passed through to the outbound such. **(OutputMode, default: <none>, possible values: `payload`,`header`)**

tensorflow.model
: The location of the pre-trained TensorFlow model file. The file, http and classpath schemas are supported. For archive locations takes the first file with '.pb' extension. Use the URI fragment parameter to specify an exact model name (e.g. https://foo/bar/model.tar.gz#frozen_inference_graph.pb) **(Resource, default: <none>)**

tensorflow.model-fetch
: The TensorFlow graph model outputs. Comma separate list of TensorFlow operation names to fetch the output Tensors from. **(List<String>, default: <none>)**

tensorflow.output-name
: The output data key used for the Header modes. **(String, default: `result`)**

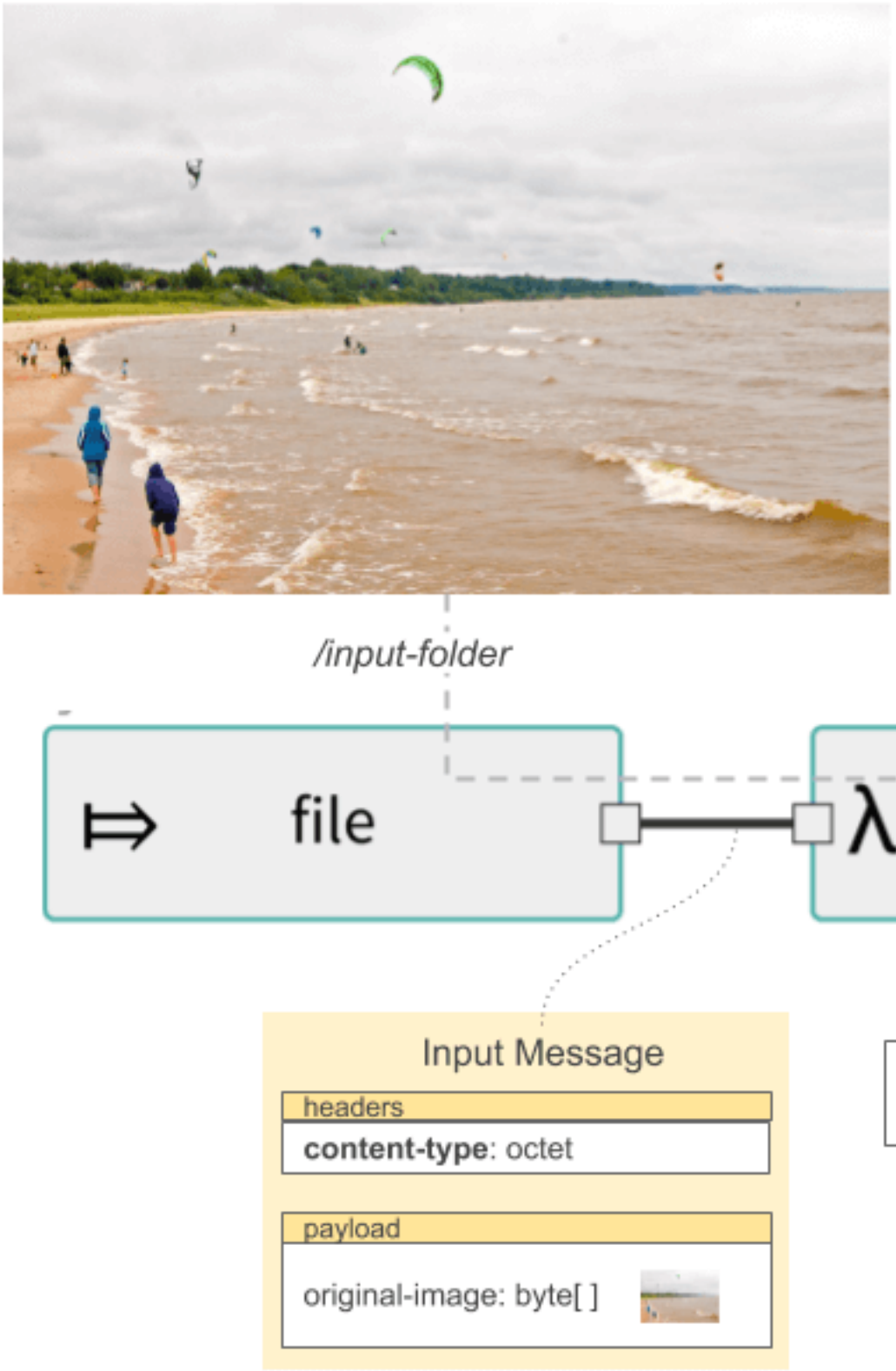
3.21 Object Detection Processor

The new Object Detection processor provides out-of-the-box support for the TensorFlow Object Detection API. It allows for real-time localization and identification of multiple objects in a single image or image stream. The Object Detection processor uses one of the pre-trained object detection models and corresponding object labels.

If the pre-trained model is not set explicitly set then following defaults are used:

- `tensorflow.modelFetch` : `detection_scores,detection_classes,detection_boxes,num_detections`
- `tensorflow.model` : `dl.bintray.com/big-data/generic/faster_rcnn_resnet101_coco_2018_01_28_frozen_inference_graph.pb`
- `tensorflow.object.detection.labels` : `dl.bintray.com/big-data/generic/mscoco_label_map.pbtxt`

The following diagram illustrates a Spring Cloud Data Flow streaming pipeline that predicts object types from the images in real-time.


Object
Detection
Model
/input-folder
file
Input Message
headers
content-type: octet
payload
original-image: byte[ ]
Object Categorie
- person, kite, ba

Processor's input is an image byte array and the output is a JSON message in this format:

```
{
  "labels" : [

 {"name":"person", "confidence":0.9996774,"x1":0.0,"y1":0.3940161,"x2":0.9465165,"y2":0.5592592,"cid":1},

 {"name":"person", "confidence":0.9996604,"x1":0.047891676,"y1":0.03169123,"x2":0.941098,"y2":0.2085562,"cid":1},

 {"name":"backpack", "confidence":0.96534747,"x1":0.15588468,"y1":0.85957795,"x2":0.5091308,"y2":0.9908878,"cid":23},

 {"name":"backpack", "confidence":0.963343,"x1":0.1273736,"y1":0.57658505,"x2":0.47765,"y2":0.6986431,"cid":23}
  ]
}
```

The output format is:

- **object-name**:**confidence** - human readable name of the detected object (e.g. label) with its confidence as a float between [0-1]
- **x1**, **y1**, **x2**, **y2** - Response also provides the bounding box of the detected objects represented as (x1, y1, x2, y2). The coordinates are relative to the size of the image size.
- **cid** - Classification identifier as defined in the provided labels configuration file.

Options

The **object-detection** processor has the following options:

tensorflow.expression
: How to obtain the input data from the input message. If empty it defaults to the input message payload. The headers[myHeaderName] expression to get input data from message's header using myHeaderName as a key. **(Expression, default: <none>)**

tensorflow.mode
: The outbound message can store the inference result either in the payload or in a header with name outputName. The payload mode (default) stores the inference result in the outbound message payload. The inbound payload is discarded. The header mode stores the inference result in outbound message's header defined by the outputName property. The the inbound message payload is passed through to the outbound such. **(OutputMode, default: <none>, possible values: `payload`,`header`)**

tensorflow.model
: The location of the pre-trained TensorFlow model file. The file, http and classpath schemas are supported. For archive locations takes the first file with '.pb' extension. Use the URI fragment parameter to specify an exact model name (e.g. https://foo/bar/model.tar.gz#frozen_inference_graph.pb) **(Resource, default: <none>)**

tensorflow.model-fetch
: The TensorFlow graph model outputs. Comma separate list of TensorFlow operation names to fetch the output Tensors from. **(List<String>, default: <none>)**

tensorflow.object.detection.color-agnostic
: If disabled (default) the bounding box colors are selected as a function of the object class id. If enabled all bounding boxes are visualized with a single color. **(Boolean, default: `false`)**

tensorflow.object.detection.confidence
: Probability threshold. Only objects detected with probability higher then the confidence threshold are accepted. Value is between 0 and 1. **(Float, default: `0.4`)**

tensorflow.object.detection.draw-bounding-box
: When set to true, the output image will be annotated with the detected object boxes **(Boolean, default: `true`)**

tensorflow.object.detection.draw-mask
: For models with mask support enable drawing the mask of the detected objects **(Boolean, default: `true`)**

tensorflow.object.detection.labels
: The text file containing the category names (e.g. labels) of all categories that this model is trained to recognize. Every category is on a separate line. **(Resource, default: <none>)**

tensorflow.output-name
: The output data key used for the Header modes. **(String, default: `result`)**

3.22 Pose Estimation Processor

Real-time, multi-person Pose Estimation processor for detecting human figures in images and video. Used for determining where different body parts are located in an image an how are they spatially relate to each other. Processor is based on the Realtime Multi-Person 2D Pose Estimation using Part Affinity Fields, OpenPose and tf-pose-estimation.	

The following diagram illustrates a Spring Cloud Data Flow streaming pipeline that predicts body postures from input images in real-time.

The Pose Estimation processor is configured with a pre-trained Tensorflow model (build with the tf-pose-estimation project). The inference of this model produces auxiliary data structures such a heatmaps with predictions about the parts locations in the image. The post-processing required for selecting the right body parts and grouping them into poses are implemented by the processor using greedy algorithms.

Use the `tensorflow.model` property to set the pre-trained Tensorflow model. Here are some options available out of the box:

- `dl.bintray.com/big-data/generic/2018-30-05-mobilenet_thin_graph_opt.pb` (default) - fast but less accurate
- `dl.bintray.com/big-data/generic/2018-05-14-cmu-graph_opt.pb` - accurate but slower

Processor's input is an image byte array and the output is a JSON message and optionally an image with annotated body poses. The output JSON format looks like:

```
[
   {
       "limbs": [ {"score": 8.4396105, "from": { "type": "lShoulder", "y": 56, "x":
160 }, "to": { "type": "lEar", "y": 24, "x": 152 } },
                  { "score": 10.145516, "from": { "type": "neck", "y": 56, "x":
144 }, "to": { "type": "rShoulder", "y": 56, "x": 128 } },
                  { "score": 9.970467, "from": { "type": "neck", "y": 56, "x":
144 }, "to": { "type": "lShoulder", "y": 56, "x": 160 } } ]
   },
   {
       "limbs": [ {"score": 7.85779, "from": { "type": "neck", "y": 48, "x":
328 }, "to": { "type": "rHip", "y": 128, "x": 328 } },
                  {"score": 6.8949876, "from": { "type": "neck", "y": 48, "x":
328 }, "to": { "type": "lHip", "y": 128, "x": 304 } } ]
  }
]
```

Every entry in the array represents a single body posture found on the image. Bodies are composed of Parts connected by Limbs represented by the **limbs** collection. Every **Limb** instance has a PAF confidence score and the `from` and `to` parts it connects. The **Part** instances have a `type` and coordinates.

Note

Output image annotated with body pose skeletons When the `tensorflow.mode=header` property is set the JSON metadata passed inside the output message header while the payload contains a copy of the input image. If the `tensorflow.pose.estimation.drawPoses=true` is set the copied input image is augmented with the poses described in the JSON metadata.

Options

The **pose-estimation** processor has the following options:

tensorflow.expression
: How to obtain the input data from the input message. If empty it defaults to the input message payload. The headers[myHeaderName] expression to get input data from message's header using myHeaderName as a key. **(Expression, default: <none>)**

tensorflow.mode
: The outbound message can store the inference result either in the payload or in a header with name outputName. The payload mode (default) stores the inference result in the outbound message payload. The inbound payload is discarded. The header mode stores the inference result in outbound message's header defined by the outputName property. The the inbound message payload is passed through to the outbound such. **(OutputMode, default: <none>, possible values: `payload`,`header`)**

tensorflow.model
: The location of the pre-trained TensorFlow model file. The file, http and classpath schemas are supported. For archive locations takes the first file with '.pb' extension. Use the URI fragment parameter to specify an exact model name (e.g. https://foo/bar/model.tar.gz#frozen_inference_graph.pb) **(Resource, default: <none>)**

tensorflow.model-fetch
: The TensorFlow graph model outputs. Comma separate list of TensorFlow operation names to fetch the output Tensors from. **(List<String>, default: <none>)**

tensorflow.output-name
: The output data key used for the Header modes. **(String, default: `result`)**

tensorflow.pose.estimation.body-drawing-color-schema
: When drawPoses is enabled, one can decide to draw all body poses in one color (monochrome), have every body pose drawn in an unique color (bodyInstance) or use common color schema drawing different limbs. **(BodyDrawingColorSchema, default: <none>, possible values: `monochrome`,`bodyInstance`,`limbType`)**

tensorflow.pose.estimation.debug-visualisation-enabled
: If enabled the inference operation will produce 4 additional debug visualization of the intermediate processing stages: - PartHeatMap - Part heat map as computed by DL - PafField - PAF limb field as computed by DL - PartCandidates - Part final candidates as computed by the post-processor - LimbCandidates - Limb final candidates as computed by the post-processor Note: Do NOT enable this feature in production or in streaming mode! **(Boolean, default: `false`)**

tensorflow.pose.estimation.debug-visualization-output-path
: Parent directory to save the debug images produced for the intermediate processing stages **(String, default: `./target`)**

tensorflow.pose.estimation.draw-line-width
: When drawPoses is enabled, defines the line width for drawing the limbs **(Integer, default: 2)**

tensorflow.pose.estimation.draw-part-labels
: if drawPoses is enabled, drawPartLabels will show the party type ids and description. **(Boolean, default: `false`)**

tensorflow.pose.estimation.draw-part-radius
: When drawPoses is enabled, defines the radius of the oval drawn for each part instance **(Integer, default: 4)**

tensorflow.pose.estimation.draw-poses
: When set to true, the output image will be augmented with the computed person skeletons **(Boolean, default: `true`)**

tensorflow.pose.estimation.min-body-part-count
: Minimum number of parts a body should contain. Body instances with less parts are discarded. **(Integer, default: 5)**

tensorflow.pose.estimation.nms-threshold
: Only return instance detections that have part score greater or equal to this value. **(Float, default: `0.15`)**

tensorflow.pose.estimation.nms-window-size
: Non-maximum suppression (NMS) distance for Part instances. Two parts suppress each other if they are less than `nmsWindowSize` pixels away. **(Integer, default: 4)**

tensorflow.pose.estimation.paf-count-threshold
: Minimum number of integration intervals with paf score above the stepPafScoreThreshold, to consider the parts connected. **(Integer, default: 2)**

tensorflow.pose.estimation.step-paf-score-threshold
: Minimal paf score between two Parts at individual integration step, to consider the parts connected **(Float, default: `0.1`)**

tensorflow.pose.estimation.total-paf-score-threshold

Minimal paf score between two parts to consider them being connected and part of the same limb **(Float, default: `4.4`)**

4. Sinks

4.1 Cassandra Sink

This sink application writes the content of each message it receives into Cassandra.

It expects a payload of JSON String and uses it's properties to map to table columns.

Input

Headers:

- `Content-Type: application/json`

Payload:

A JSON String or byte array representing the entity (or a list of entities) to be persisted

Output

```
N/A
```

Options

The **cassandra** sink has the following options:

cassandra.async
: Async mode for CassandraMessageHandler. **(Boolean, default: `true`)**

cassandra.cluster.create-keyspace
: Flag to create (or not) keyspace on application startup. **(Boolean, default: `false`)**

cassandra.cluster.entity-base-packages
: Base packages to scan for entities annotated with Table annotations. **(String[], default: `[]`)**

cassandra.cluster.init-script
: Resource with CQL scripts (delimited by ';') to initialize keyspace schema. **(Resource, default: <none>)**

cassandra.cluster.metrics-enabled
: Enable/disable metrics collection for the created cluster. **(Boolean, default: <none>)**

cassandra.cluster.skip-ssl-validation
: Flag to validate the Servers' SSL certs **(Boolean, default: `false`)**

cassandra.consistency-level
: The consistency level for write operation. **(ConsistencyLevel, default: <none>, possible values: `ANY`,`ONE`,`TWO`,`THREE`,`QUORUM`,`ALL`,`LOCAL_QUORUM`,`EACH_QUORUM`,`SERIAL`,`LOCAL_SERIAL`,`LOCAL_ONE`)**

cassandra.ingest-query
: Ingest Cassandra query. **(String, default: <none>)**

cassandra.query-type
: QueryType for Cassandra Sink. **(Type, default: <none>, possible values: `INSERT`,`UPDATE`,`DELETE`,`STATEMENT`)**

cassandra.statement-expression
Expression in Cassandra query DSL style. **(Expression, default: <none>)**

cassandra.ttl
Time-to-live option of WriteOptions. **(Integer, default: `0`)**

spring.data.cassandra.cluster-name
Name of the Cassandra cluster. **(String, default: <none>)**

spring.data.cassandra.compression
Compression supported by the Cassandra binary protocol. **(Compression, default: none, possible values: `,`snappy,lz4)**

spring.data.cassandra.connect-timeout
Socket option: connection time out. **(Duration, default: <none>)**

spring.data.cassandra.consistency-level
Queries consistency level. **(ConsistencyLevel, default: <none>, possible values: ANY,ONE,TWO,THREE,QUORUM,ALL,LOCAL_QUORUM,EACH_QUORUM,SERIAL,LOCAL_SERIAL,LOCAL_ONE)**

spring.data.cassandra.contact-points
Cluster node addresses. **(List<String>, default: [localhost])**

spring.data.cassandra.fetch-size
Queries default fetch size. **(Integer, default: <none>)**

spring.data.cassandra.jmx-enabled
Whether to enable JMX reporting. Default to false as Cassandra JMX reporting is not compatible with Dropwizard Metrics. **(Boolean, default: `false`)**

spring.data.cassandra.keyspace-name
Keyspace name to use. **(String, default: <none>)**

spring.data.cassandra.load-balancing-policy
Class name of the load balancing policy. The class must have a default constructor. **(Class<LoadBalancingPolicy>, default: <none>)**

spring.data.cassandra.password
Login password of the server. **(String, default: <none>)**

spring.data.cassandra.port
Port of the Cassandra server. **(Integer, default: <none>)**

spring.data.cassandra.read-timeout
Socket option: read time out. **(Duration, default: <none>)**

spring.data.cassandra.reconnection-policy
Class name of the reconnection policy. The class must have a default constructor. **(Class<ReconnectionPolicy>, default: <none>)**

spring.data.cassandra.retry-policy
Class name of the retry policy. The class must have a default constructor. **(Class<RetryPolicy>, default: <none>)**

spring.data.cassandra.schema-action
Schema action to take at startup. **(String, default: none)**

spring.data.cassandra.serial-consistency-level
Queries serial consistency level. **(ConsistencyLevel, default: <none>, possible values: ANY,ONE,TWO,THREE,QUORUM,ALL,LOCAL_QUORUM,EACH_QUORUM,SERIAL,LOCAL_SERIAL,LOCAL_ONE)**

spring.data.cassandra.ssl
Enable SSL support. **(Boolean, default: `false`)**

spring.data.cassandra.username
Login user of the server. **(String, default: <none>)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

The following example assumes a JSON payload is sent to a default destination called `input`, the sink parses some of its properties (id,time,customer_id,value) and persists them into a table called `orders`.

```
java -jar cassandra_sink.jar --cassandra.cluster.keyspace=test
--cassandra.ingest-query="insert into orders(id,time,customer_id, value) values (?,?,?,?)"
```

4.2 Counter Sink

Counter that compute multiple counters from the received messages. It leverages the Micrometer library and can use various popular TSDB to persist the counter values.

By default the Counter Sink increments the `message.name` counter on every received message. The `message-counter-enabled` allows you to disable this counter when required.

If tag expressions are provided (via the `counter.tag.expression.<tagKey>=<tagValue SpEL expression> property) then the `name` counter is incremented. Note that each SpEL expression can evaluate into multiple values resulting into multiple counter increments (one fore every value resolved).

If fixed tags are provided they are include in all message and expression counter increment measurements.

Counter's implementation is based on the Micrometer library which is a Vendor-neutral application metrics facade that supports the most popular monitoring systems. See the Micrometer documentation for the list of supported monitoring systems. Starting with Spring Boot 2.0, Micrometer is the instrumentation library powering the delivery of application metrics from Spring Boot.

All Spring Cloud Stream App Starters are configured to support two of the most popular monitoring systems, Prometheus and InfluxDB. You can declaratively select which monitoring system to use. If you

are not using Prometheus or InfluxDB, you can customise the App starters to use a different monitoring system as well as include your preferred micrometer monitoring system library in your own custom applications.

Grafana is a popular platform for building visualization dashboards.

To enable Micrometer's Prometheus meter registry for Spring Cloud Stream application starters, set the following properties.

```
management.metrics.export.prometheus.enabled=true
management.endpoints.web.exposure.include=prometheus
```

and disable the application's security which allows for a simple Prometheus configuration to scrape counter information by setting the following property.

```
spring.cloud.streamapp.security.enabled=false
```

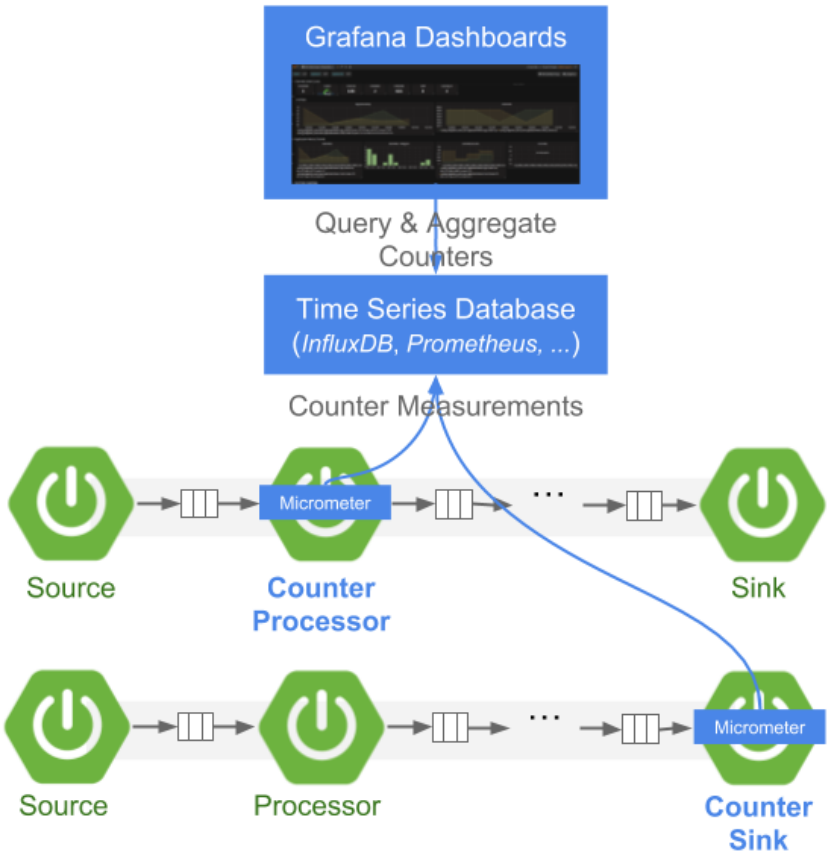
To enable Micrometer's Influx meter registry for Spring Cloud Stream application starters, set the following property.

```
management.metrics.export.influx.enabled=true
management.metrics.export.influx.uri={influxdb-server-url}
```

Note

if the Data Flow Server metrics is enabled then the `Counter` will reuse the exiting configurations.

Following diagram illustrates Counter's information collection and processing flow.



Options

counter.message-counter-enabled
: Enables counting the number of messages processed. Uses the 'message.' counter name prefix to distinct it form the expression based counter. The message counter includes the fixed tags when provided. **(Boolean, default: `true`)**

counter.name
: The name of the counter to increment. **(String, default: <none>)**

counter.name-expression
: A SpEL expression (against the incoming Message) to derive the name of the counter to increment. **(Expression, default: <none>)**

counter.tag.expression
: Computes tags from SpEL expression. Single SpEL expression can produce an array of values, which in turn means distinct name/value tags. Every name/value tag will produce a separate counter increment. Tag expression format is: counter.tag.expression.[tag-name]=[SpEL expression] **(Map<String, Expression>, default: <none>)**

counter.tag.fixed
: Custom tags assigned to every counter increment measurements. This is a map so the property convention fixed tags is: counter.tag.fixed.[tag-name]=[tag-value] **(Map<String, String>, default: <none>)**

4.3 File Sink

This module writes each message it receives to a file.

Input

Headers

N/A

Payload

- `java.io.File`
- `java.io.InputStream`
- `byte[]`
- `String`

Output

N/A (writes to the file system).

Options

The **file** sink has the following options:

file.binary
: A flag to indicate whether adding a newline after the write should be suppressed. **(Boolean, default: `false`)**

file.charset
: The charset to use when writing text content. **(String, default: `UTF-8`)**

file.directory
: The parent directory of the target file. **(String, default: <none>)**

file.directory-expression
: The expression to evaluate for the parent directory of the target file. **(Expression, default: <none>)**

file.mode
: The FileExistsMode to use if the target file already exists. **(FileExistsMode, default: <none>, possible values: `APPEND,APPEND_NO_FLUSH,FAIL,IGNORE,REPLACE,REPLACE_IF_MODIFIED`)**

file.name
: The name of the target file. **(String, default: `file-sink`)**

file.name-expression
: The expression to evaluate for the name of the target file. **(String, default: <none>)**

file.suffix
: The suffix to append to file name. **(String, default: `<empty string>`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps

You can find the corresponding binder based projects here. You can then cd into one of the folders and
 build it:

$ ./mvnw clean package
```

Examples

```
java -jar file_sink.jar --file.directory=/tmp/bar
```

4.4 FTP Sink

FTP sink is a simple option to push files to an FTP server from incoming messages.

It uses an `ftp-outbound-adapter`, therefore incoming messages can be either a `java.io.File` object, a `String` (content of the file) or an array of `bytes` (file content as well).

To use this sink, you need a username and a password to login.

Note

By default Spring Integration will use `o.s.i.file.DefaultFileNameGenerator` if none is specified. `DefaultFileNameGenerator` will determine the file name based on the value of the `file_name` header (if it exists) in the `MessageHeaders`, or if the payload of the `Message` is already a `java.io.File`, then it will use the original name of that file.

Input

Headers

- `file_name` (See note above)

Payload

- `java.io.File`
- `java.io.InputStream`
- `byte[]`
- `String`

Output

N/A (writes to the FTP server).

Options

The **ftp** sink has the following options:

ftp.auto-create-dir
: Whether or not to create the remote directory. **(Boolean, default: `true`)**

ftp.factory.cache-sessions
: <documentation missing> **(Boolean, default: <none>)**

ftp.factory.client-mode
: The client mode to use for the FTP session. **(ClientMode, default: <none>, possible values: `ACTIVE`,`PASSIVE`)**

ftp.factory.host
: <documentation missing> **(String, default: <none>)**

ftp.factory.password
: <documentation missing> **(String, default: <none>)**

ftp.factory.port
: The port of the server. **(Integer, default: `21`)**

ftp.factory.username
: <documentation missing> **(String, default: <none>)**

ftp.filename-expression
: A SpEL expression to generate the remote file name. **(Expression, default: <none>)**

ftp.mode
: Action to take if the remote file already exists. **(FileExistsMode, default: <none>, possible values: `APPEND`,`APPEND_NO_FLUSH`,`FAIL`,`IGNORE`,`REPLACE`,`REPLACE_IF_MODIFIED`)**

ftp.remote-dir
: The remote FTP directory. **(String, default: `/`)**

ftp.remote-file-separator
: The remote file separator. **(String, default: `/`)**

ftp.temporary-remote-dir
: A temporary directory where the file will be written if '#isUseTemporaryFilename()' is true. **(String, default: `/`)**

ftp.tmp-file-suffix
: The suffix to use while the transfer is in progress. **(String, default: `.tmp`)**

ftp.use-temporary-filename
: Whether or not to write to a temporary file and rename. **(Boolean, default: `true`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar ftp_sink.jar --ftp.remote-dir=bar --ftp.factory.host=ftpserver \
         --ftp.factory.username=user --ftp.factory.password=pw
```

4.5 Gemfire Sink

The Gemfire sink allows one to write message payloads to a Gemfire server.

To enable SSL communication between Geode Sink and the Geode cluster you need to provide the URIs of the Keystore and Truststore files using the `gemfire.security.ssl.keystore-uri` and `gemfire.security.ssl.truststore-uri` properties. (If a single file is used for both stores then point both URIs to it).

Input

Headers

- `content-type: text/plain`

Payload

- `String`

Headers

- `content-type: application/x-java-serialized-object`

Payload

- `java.io.Serializable`

Output

N/A

Options

The **gemfire** sink has the following options:

gemfire.json
: Indicates if the Gemfire region stores json objects as native Gemfire PdxInstance **(Boolean, default: `false`)**

gemfire.key-expression
: SpEL expression to use as a cache key **(String, default: <none>)**

gemfire.pool.connect-type
: Specifies connection type: 'server' or 'locator'. **(ConnectType, default: <none>, possible values: `locator`,`server`)**

gemfire.pool.host-addresses
: Specifies one or more Gemfire locator or server addresses formatted as [host]:[port]. **(InetSocketAddress[], default: <none>)**

gemfire.pool.subscription-enabled
: Set to true to enable subscriptions for the client pool. Required to sync updates to the client cache. **(Boolean, default: `false`)**

gemfire.region.region-name
: The region name. **(String, default: <none>)**

gemfire.security.password
: The cache password. **(String, default: <none>)**

gemfire.security.ssl.ciphers
: Configures the SSL ciphers used for secure Socket connections as an array of valid cipher names. **(String, default: any)**

gemfire.security.ssl.keystore-type
: Identifies the type of Keystore used for SSL communications (e.g. JKS, PKCS11, etc.). **(String, default: `JKS`)**

gemfire.security.ssl.keystore-uri
: Location of the pre-created Keystore URI to be used for connecting to the Geode cluster. **(Resource, default: <none>)**

gemfire.security.ssl.ssl-keystore-password
: Password for accessing the keys truststore **(String, default: <none>)**

gemfire.security.ssl.ssl-truststore-password
: Password for accessing the trust store. **(String, default: <none>)**

gemfire.security.ssl.truststore-type
: Identifies the type of truststore used for SSL communications (e.g. JKS, PKCS11, etc.). **(String, default: `JKS`)**

gemfire.security.ssl.truststore-uri
: Location of the pre-created truststore URI to be used for connecting to the Geode cluster. **(Resource, default: <none>)**

gemfire.security.ssl.user-home-directory
: Local directory to cache the truststore and keystore files downloaded form the truststoreUri and keystoreUri locations. **(String, default: `user.home`)**

gemfire.security.username
: The cache username. **(String, default: <none>)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar gemfire-sink.jar --gemfire.keyExpression=
```

4.6 Gpfdist Sink

A sink module that route messages into `GPDB/HAWQ` segments via *gpfdist* protocol. Internally, this sink creates a custom http listener that supports the `gpfdist` protcol and schedules a task that orchestrates a `gploadd` session in the same way it is done natively in Greenplum.

No data is written into temporary files and all data is kept in stream buffers waiting to get inserted into Greenplum DB or HAWQ. If there are no existing load sessions from Greenplum, the sink will block until such sessions are established.

Input

Headers:

- `Content-Type: text/plain`

Payload:

- `String`

Output

N/A

Options

The **gpfdist** sink has the following options:

gpfdist.batch-count
: Number of windowed batch each segment takest (int, default: 100) **(Integer, default: `100`)**

gpfdist.batch-period
: Time in seconds for each load operation to sleep in between operations (int, default: 10) **(Integer, default: `10`)**

gpfdist.batch-timeout
: Timeout in seconds for segment inactivity. (Integer, default: 4) **(Integer, default: `4`)**

gpfdist.column-delimiter
Data record column delimiter. *(Character, default: no default) **(Character, default: <none>)**

gpfdist.control-file
Path to yaml control file (String, no default) **(Resource, default: <none>)**

gpfdist.db-host
Database host (String, default: localhost) **(String, default: `localhost`)**

gpfdist.db-name
Database name (String, default: gpadmin) **(String, default: `gpadmin`)**

gpfdist.db-password
Database password (String, default: gpadmin) **(String, default: `gpadmin`)**

gpfdist.db-port
Database port (int, default: 5432) **(Integer, default: `5432`)**

gpfdist.db-user
Database user (String, default: gpadmin) **(String, default: `gpadmin`)**

gpfdist.delimiter
Data line delimiter (String, default: newline character) **(String, default:)**

gpfdist.flush-count
Flush item count (int, default: 100) **(Integer, default: `100`)**

gpfdist.flush-time
Flush item time (int, default: 2) **(Integer, default: `2`)**

gpfdist.gpfdist-port
Port of gpfdist server. Default port `0` indicates that a random port is chosen. (Integer, default: 0) **(Integer, default: `0`)**

gpfdist.log-errors
Enable log errors. (Boolean, default: false) **(Boolean, default: `false`)**

gpfdist.match-columns
Match columns with update (String, no default) **(String, default: <none>)**

gpfdist.mode
Mode, either insert or update (String, no default) **(String, default: <none>)**

gpfdist.null-string
Null string definition. (String, default: ``) **(String, default: <none>)**

gpfdist.rate-interval
Enable transfer rate interval (int, default: 0) **(Integer, default: `0`)**

gpfdist.segment-reject-limit
Error reject limit. (String, default: ``) **(String, default: <none>)**

gpfdist.segment-reject-type
Error reject type, either `rows` or `percent`. (String, default: `rows`) **(SegmentRejectType, default: <none>, possible values: `ROWS`,`PERCENT`)**

gpfdist.sql-after
Sql to run after load (String, no default) **(String, default: <none>)**

gpfdist.sql-before
Sql to run before load (String, no default) **(String, default: <none>)**

gpfdist.table
Target database table (String, no default) **(String, default: <none>)**

gpfdist.update-columns
Update columns with update (String, no default) **(String, default: <none>)**

spring.net.hostdiscovery.loopback
The new loopback flag. Default value is FALSE **(Boolean, default: `false`)**

spring.net.hostdiscovery.match-interface
The new match interface regex pattern. Default value is is empty **(String, default: <none>)**

spring.net.hostdiscovery.match-ipv4
Used to match ip address from a network using a cidr notation **(String, default: <none>)**

spring.net.hostdiscovery.point-to-point
The new point to point flag. Default value is FALSE **(Boolean, default: `false`)**

spring.net.hostdiscovery.prefer-interface
The new preferred interface list **(List<String>, default: <none>)**

Implementation Notes

Within a `gpfdist` sink we have a Reactor based stream where data is published from the incoming SI channel. This channel receives data from the Message Bus. The Reactor stream is then connected to `Netty` based http channel adapters so that when a new http connection is established, the Reactor stream is flushed and balanced among existing http clients. When `Greenplum` does a load from an external table, each segment will initiate a http connection and start loading data. The net effect is that incoming data is automatically spread among the Greenplum segments.

Detailed Option Descriptions

The **gpfdist** sink supports the following configuration properties:

table
Database table to work with. **(String, default: ``, required)**

This option denotes a table where data will be inserted or updated. Also external table structure will be derived from structure of this table.

Currently `table` is only way to define a structure of an external table. Effectively it will replace `other_table` in below clause segment.

```
CREATE READABLE EXTERNAL TABLE table_name LIKE other_table
```

mode
Gpfdist mode, either `insert` or `update`. **(String, default: `insert`)**

Currently only `insert` and `update` gpfdist mode is supported. Mode `merge` familiar from a native gpfdist loader is not yet supported.

For mode `update` options `matchColumns` and `updateColumns` are required.

columnDelimiter
: Data record column delimiter. **(Character, default: ``)**

  Defines used `delimiter` character in below clause segment which would be part of a `FORMAT 'TEXT'` or `FORMAT 'CSV'` sections.

```
[DELIMITER AS 'delimiter']
```

segmentRejectLimit
: Error reject limit. **(String, default: ``)**

  Defines a `count` value in a below clause segment.

```
[ [LOG ERRORS] SEGMENT REJECT LIMIT count
  [ROWS | PERCENT] ]
```

  As a conveniance this reject limit also recognizes a percentage format 2% and if used, `segmentRejectType` is automatically set to `percent`.

segmentRejectType
: Error reject type, either `rows` or `percent`. **(String, default: ``)**

  Defines `ROWS` or `PERCENT` in below clause segment.

```
[ [LOG ERRORS] SEGMENT REJECT LIMIT count
  [ROWS | PERCENT] ]
```

logErrors
: Enable or disable log errors. **(Boolean, default: `false`)**

  As error logging is optional with `SEGMENT REJECT LIMIT`, it's only used if both `segmentRejectLimit` and `segmentRejectType` are set. Enables the error log in below clause segment.

```
[ [LOG ERRORS] SEGMENT REJECT LIMIT count
  [ROWS | PERCENT] ]
```

nullString
: Null string definition. **(String, default: ``)**

  Defines used `null string` in below clause segment which would be part of a `FORMAT 'TEXT'` or `FORMAT 'CSV'` sections.

```
[NULL AS 'null string']
```

delimiter
: Data record delimiter for incoming messages. **(String, default: `\n`)**

  On default a delimiter in this option will be added as a postfix to every message sent into this sink. Currently *NEWLINE* is not a supported config option and line termination for data is coming from a default functionality.

> If not specified, a Greenplum Database segment will detect the newline type by looking at the first row of data it receives and using the first newline type encountered.

— External Table Docs

matchColumns
: Comma delimited list of columns to match. **(String, default: ``)**

Note

See more from examples below.

updateColumns
: Comma delimited list of columns to update. **(String, default: ``)**

Note

See more from examples below.

sqlBefore
: Sql clause to run before each load operation. **(String, default: ``)**

sqlAfter
: Sql clause to run after each load operation. **(String, default: ``)**

rateInterval
: Debug rate of data transfer. **(Integer, default: `0`)**

  If set to non zero, sink will log a rate of messages passing throught a sink after number of messages denoted by this setting has been processed. Value `0` means that this rate calculation and logging is disabled.

flushCount
: Max collected size per windowed data. **(Integer, default: `100`)**

Note

For more info on flush and batch settings, see above.

How Data Is Sent Into Segments

There are few important concepts involving how data passes into a sink, through it and finally lands into a database.

- Sink has its normal message handler for incoming data from a source module, gpfdist protocol listener based on netty where segments connect to and in between those two a reactor based streams controlling load balancing into different segment connections.
- Incoming data is first sent into a reactor which first constructs a windows. This window is then released into a downstream when it gets full(`flushTime`) or timeouts(`flushTime`) if window doesn't get full. One window is then ready to get send into a segment.
- Segments which connects to this stream are now able to see a stream of window data, not stream of individual messages. We can also call this as a stream of batches.
- When segment makes a connection to a protocol listener it subscribes itself into this stream and takes count of batches denoted by `batchCount` and completes a stream if it got enough batches or if `batchTimeout` occurred due to inactivity.

- It doesn't matter how many simultaneous connections there are from a database cluster at any given time as reactor will load balance batches with all subscribers.
- Database cluster will initiate this loading session when select is done from an external table which will point to this sink. These loading operations are run in a background in a loop one after another. Option `batchPeriod` is then used as a sleep time in between these load sessions.

Lets take a closer look how options `flushCount`, `flushTime`, `batchCount`, `batchTimeout` and `batchPeriod` work.

As in a highest level where incoming data into a sink is windowed, `flushCount` and `flushTime` controls when a batch of messages are sent into a downstream. If there are a lot of simultaneous segment connections, flushing less will keep more segments inactive as there is more demand for batches than what flushing will produce.

When existing segment connection is active and it has subscribed itself with a stream of batches, data will keep flowing until either `batchCount` is met or `batchTimeout` occurs due to inactivity of data from an upstream. Higher a `batchCount` is more data each segment will read. Higher a `batchTimeout` is more time segment will wait in case there is more data to come.

As gpfdist load operations are done in a loop, `batchPeriod` simply controls not to run things in a buzy loop. Buzy loop would be ok if there is a constant stream of data coming in but if incoming data is more like bursts then buzy loop would be unnecessary.

Note

Data loaded via gpfdist will not become visible in a database until whole distributed loading session have finished successfully.

Reactor is also handling backpressure meaning if existing load operations will not produce enought demand for data, eventually message passing into a sink will block. This happens when Reactor's internal ring buffer(size of 32 items) gets full. Flow of data through sink really happens when data is pulled from it by segments.

Example Usage

In this first example we're just creating a simple stream which inserts data from a `time` source. Let's create a table with two *text* columns.

```
gpadmin=# create table ticktock (date text, time text);
```

Create a simple stream `gpstream`.

```
dataflow:>stream create --name gpstream1 --definition "time | gpfdist
--dbHost=mdw --table=ticktock --batchTime=1 --batchPeriod=1
--flushCount=2 --flushTime=2 --columnDelimiter=' '" --deploy
```

Let it run and see results from a database.

```
gpadmin=# select count(*) from ticktock;
 count
-------
    14
(1 row)
```

In previous example we did a simple inserts into a table. Let's see how we can update data in a table. Create a simple table *httpdata* with three text columns and insert some data.

```
gpadmin=# create table httpdata (col1 text, col2 text, col3 text);
gpadmin=# insert into httpdata values ('DATA1', 'DATA', 'DATA');
gpadmin=# insert into httpdata values ('DATA2', 'DATA', 'DATA');
gpadmin=# insert into httpdata values ('DATA3', 'DATA', 'DATA');
```

Now table looks like this.

```
gpadmin=# select * from httpdata;
 col1  | col2 | col3
-------+------+------
 DATA3 | DATA | DATA
 DATA2 | DATA | DATA
 DATA1 | DATA | DATA
(3 rows)
```

Let's create a stream which will update table *httpdata* by matching a column *col1* and updates columns *col2* and *col3*.

```
dataflow:>stream create --name gpfdiststream2 --definition "http
--server.port=8081|gpfdist --mode=update --table=httpdata
--dbHost=mdw --columnDelimiter=',' --matchColumns=col1
--updateColumns=col2,col3" --deploy
```

Post some data into a stream which will be passed into a *gpfdist* sink via *http* source.

```
curl --data "DATA1,DATA1,DATA1" -H "Content-Type:text/plain" http://localhost:8081/
```

If you query table again, you'll see that row for *DATA1* has been updated.

```
gpadmin=# select * from httpdata;
 col1  | col2  | col3
-------+-------+-------
 DATA3 | DATA  | DATA
 DATA2 | DATA  | DATA
 DATA1 | DATA1 | DATA1
(3 rows)
```

Tuning Transfer Rate

Default values for options `flushCount`, `flushTime`, `batchCount`, `batchTimeout` and `batchPeriod` are relatively conservative and needs to be *tuned* for every use case for optimal performance. Order to make a decision on how to tune sink behaviour to suit your needs few things needs to be considered.

- What is an average size of messages ingested by a sink.
- How fast you want data to become visible in a database.
- Is incoming data a constant flow or a bursts of data.

Everything what flows throught a sink is kept in-memory and because sink is handling backpressure, memory consumption is relatively low. However because sink cannot predict what is an average size of an incoming data and this data is anyway windowed later in a downstream you should not allow window size to become too large if average data size is large as every batch of data is kept in memory.

Generally speaking if you have a lot of segments in a load operation, it's adviced to keep flushed window size relatively small which allows more segments to stay active. This however also depends on how much data is flowing in into a sink itself.

Longer a load session for each segment is active higher the overall transfer rate is going to be. Option `batchCount` naturally controls this. However option `batchTimeout` then really controls how fast each segment will complete a stream due to inactivity from upstream and to step away from a loading session to allow distributes session to finish and data become visible in a database.

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

See above.

4.7 HDFS Sink

This module writes each message it receives to HDFS.

Input

Headers

Payload

Any

Output

N/A

Options

The **hdfs** sink has the following options:

hdfs.close-timeout
: Timeout in ms, regardless of activity, after which file will be automatically closed. **(Long, default: `0`)**

hdfs.codec
: Compression codec alias name (gzip, snappy, bzip2, lzo, or slzo). **(String, default: <none>)**

hdfs.directory
: Base path to write files to. **(String, default: <none>)**

hdfs.enable-sync
: Whether writer will sync to datanode when flush is called, setting this to 'true' could impact throughput. **(Boolean, default: `false`)**

hdfs.file-extension
: The base filename extension to use for the created files. **(String, default: `txt`)**

hdfs.file-name
: The base filename to use for the created files. **(String, default: <none>)**

hdfs.file-open-attempts
: Maximum number of file open attempts to find a path. **(Integer, default: `10`)**

hdfs.file-uuid
: Whether file name should contain uuid. **(Boolean, default: `false`)**

hdfs.flush-timeout
: Timeout in ms, regardless of activity, after which data written to file will be flushed. **(Long, default: `0`)**

hdfs.fs-uri
: URL for HDFS Namenode. **(String, default: <none>)**

hdfs.idle-timeout
: Inactivity timeout in ms after which file will be automatically closed. **(Long, default: `0`)**

hdfs.in-use-prefix
: Prefix for files currently being written. **(String, default: <none>)**

hdfs.in-use-suffix
: Suffix for files currently being written. **(String, default: <none>)**

hdfs.overwrite
: Whether writer is allowed to overwrite files in Hadoop FileSystem. **(Boolean, default: `false`)**

hdfs.partition-path
: A SpEL expression defining the partition path. **(String, default: <none>)**

hdfs.rollover
: Threshold in bytes when file will be automatically rolled over. **(Integer, default: `1000000000`)**

Note

This module can have it's runtime dependencies provided during startup if you would like to use a Hadoop distribution other than the default one.

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar hdfs-sink.jar --fsUri
```

4.8 Jdbc Sink

A module that writes its incoming payload to an RDBMS using JDBC.

Input

Headers

Payload

- Any

Column expression will be evaluated against the message and the expression will usually be compatible with only one type (such as a Map or bean etc.)

Output

N/A

Options

The **jdbc** sink has the following options:

jdbc.columns
: The comma separated colon-based pairs of column names and SpEL expressions for values to insert/update. Names are used at initialization time to issue the DDL. **(String, default: `payload:payload.toString()`)**

jdbc.initialize
: 'true', 'false' or the location of a custom initialization script for the table. **(String, default: `false`)**

jdbc.table-name
: The name of the table to write into. **(String, default: `messages`)**

jdbc.batch-size
: Threshold in number of messages when data will be flushed to database table. **(Integer, default: `1`)**

jdbc.idle-timeout
: Idle timeout in milliseconds when data is automatically flushed to database table. **(Long, default: `-1`)**

spring.datasource.data
: Data (DML) script resource references. **(List<String>, default: <none>)**

spring.datasource.driver-class-name
: Fully qualified name of the JDBC driver. Auto-detected based on the URL by default. **(String, default: <none>)**

spring.datasource.initialization-mode
: Initialize the datasource using available DDL and DML scripts. **(DataSourceInitializationMode, default: `embedded`, possible values: `ALWAYS`,`EMBEDDED`,`NEVER`)**

spring.datasource.password
: Login password of the database. **(String, default: <none>)**

spring.datasource.schema
: Schema (DDL) script resource references. **(List<String>, default: <none>)**

spring.datasource.url
: JDBC url of the database. **(String, default: <none>)**

spring.datasource.username
: Login username of the database. **(String, default: <none>)**

The `jdbc.columns` property represents pairs of `COLUMN_NAME[:EXPRESSION_FOR_VALUE]` where `EXPRESSION_FOR_VALUE` (together with the colon) is optional. In this case the value is evaluated via generated expression like `payload.COLUMN_NAME`, so this way we have a direct mapping from object properties to the table column. For example we have a JSON payload like:

```
{
  "name": "My Name"
  "address": {
     "city": "Big City",
     "street": "Narrow Alley"
  }
}
```

So, we can insert it into the table with `name`, `city` and `street` structure using the configuration:

```
--jdbc.columns=name,city:address.city,street:address.street
```

This sink supports batch inserts, as far as supported by the underlying JDBC driver. Batch inserts are configured via the `batch-size` and `idle-timeout` properties: Incoming messages are aggregated until `batch-size` messages are present, then inserted as a batch. If `idle-timeout` milliseconds pass with no new messages, the aggregated batch is inserted even if it is smaller than `batch-size`, capping maximum latency.

Note

The module also uses Spring Boot's DataSource support for configuring the database connection, so properties like `spring.datasource.url` *etc.* apply.

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar jdbc-sink.jar --jdbc.tableName=names --jdbc.columns=name --spring.datasource.driver-class-
name=org.mariadb.jdbc.Driver \
--spring.datasource.url='jdbc:mysql://localhost:3306/test
```

4.9 Log Sink

The `log` sink uses the application logger to output the data for inspection.

Please understand that `log` sink uses type-less handler, which affects how the actual logging will be performed. This means that if the content-type is textual, then raw payload bytes will be converted to String, otherwise raw bytes will be logged. Please see more info in the user-guide.

Input

Headers

Payload

Any

Output

N/A

Options

The **log** sink has the following options:

log.expression
: A SpEL expression (against the incoming message) to evaluate as the logged message. **(String, default: `payload`)**

log.level
: The level at which to log messages. **(Level, default: <none>, possible values: `FATAL`,`ERROR`,`WARN`,`INFO`,`DEBUG`,`TRACE`)**

log.name
: The name of the logger to use. **(String, default: <none>)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar log-sink.jar
```

4.10 RabbitMQ Sink

This module sends messages to RabbitMQ.

Input

Headers

- `content-type: text/plain`

Payload

- `String`

Headers

- `content-type: application/octet-stream`

Payload

- `byte[]`

Headers

- `content-type: application/x-java-serialized-object`

Payload

- `java.io.Serializable`

Note: With `converterBeanName = jsonConverter` any object that can be converted to JSON by Jackson (content type sent to rabbit will be `application/json` with type information in other headers.

With `converterBeanName` set to something else, payload will be any object that the converter can handle.

Output

N/A

Options

The **rabbit** sink has the following options:

(See the Spring Boot documentation for RabbitMQ connection properties)

rabbit.converter-bean-name
: The bean name for a custom message converter; if omitted, a SimpleMessageConverter is used. If 'jsonConverter', a Jackson2JsonMessageConverter bean will be created for you. **(String, default: <none>)**

rabbit.exchange
: Exchange name - overridden by exchangeNameExpression, if supplied. **(String, default: `<empty string>`)**

rabbit.exchange-expression
: A SpEL expression that evaluates to an exchange name. **(Expression, default: <none>)**

rabbit.mapped-request-headers
: Headers that will be mapped. **(String[], default: `[*]`)**

rabbit.own-connection
: When true, use a separate connection based on the boot properties. **(Boolean, default: `false`)**

rabbit.persistent-delivery-mode
: Default delivery mode when 'amqp_deliveryMode' header is not present, true for PERSISTENT. **(Boolean, default: `false`)**

rabbit.routing-key
: Routing key - overridden by routingKeyExpression, if supplied. **(String, default: <none>)**

rabbit.routing-key-expression
A SpEL expression that evaluates to a routing key. **(Expression, default: <none>)**

spring.rabbitmq.addresses
Comma-separated list of addresses to which the client should connect. **(String, default: <none>)**

spring.rabbitmq.connection-timeout
Connection timeout. Set it to zero to wait forever. **(Duration, default: <none>)**

spring.rabbitmq.host
RabbitMQ host. **(String, default: `localhost`)**

spring.rabbitmq.password
Login to authenticate against the broker. **(String, default: `guest`)**

spring.rabbitmq.port
RabbitMQ port. **(Integer, default: `5672`)**

spring.rabbitmq.publisher-confirms
Whether to enable publisher confirms. **(Boolean, default: `false`)**

spring.rabbitmq.publisher-returns
Whether to enable publisher returns. **(Boolean, default: `false`)**

spring.rabbitmq.requested-heartbeat
Requested heartbeat timeout; zero for none. If a duration suffix is not specified, seconds will be used. **(Duration, default: <none>)**

spring.rabbitmq.username
Login user to authenticate to the broker. **(String, default: `guest`)**

spring.rabbitmq.virtual-host
Virtual host to use when connecting to the broker. **(String, default: <none>)**

Note

By default, the message converter is a `SimpleMessageConverter` which handles `byte[]`, `String` and `java.io.Serializable`. A well-known bean name `jsonConverter` will configure a `Jackson2JsonMessageConverter` instead. In addition, a custom converter bean can be added to the context and referenced by the converterBeanName property.

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar rabbit-sink.jar --rabbit.routingKey=
java -jar rabbit-sink.jar --rabbit.routingKeyExpression=
```

4.11 MongoDB Sink

This sink application ingest incoming data into MongoDB. This application is fully based on the `MongoDataAutoConfiguration`, so refer to the Spring Boot MongoDB Support for more information.

Input

Headers

Payload

- Any POJO
- `String`
- `byte[]`

Output

N/A

Options

The **mongodb** sink has the following options:

mongodb.collection
: The MongoDB collection to store data **(String, default: <none>)**

mongodb.collection-expression
: The SpEL expression to evaluate MongoDB collection **(Expression, default: <none>)**

spring.data.mongodb.authentication-database
: Authentication database name. **(String, default: <none>)**

spring.data.mongodb.database
: Database name. **(String, default: <none>)**

spring.data.mongodb.field-naming-strategy
: Fully qualified name of the FieldNamingStrategy to use. **(Class<?>, default: <none>)**

spring.data.mongodb.grid-fs-database
: GridFS database name. **(String, default: <none>)**

spring.data.mongodb.host
: Mongo server host. Cannot be set with URI. **(String, default: <none>)**

spring.data.mongodb.password
: Login password of the mongo server. Cannot be set with URI. **(Character[], default: <none>)**

spring.data.mongodb.port
: Mongo server port. Cannot be set with URI. **(Integer, default: <none>)**

spring.data.mongodb.uri
: Mongo database URI. Cannot be set with host, port and credentials. **(String, default: `mongodb://localhost/test`)**

spring.data.mongodb.username
: Login user of the mongo server. Cannot be set with URI. **(String, default: <none>)**

Also see the Spring Boot Documentation for additional `MongoProperties` properties.

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar mongodb-sink.jar --mongodb.collection=
java -jar mongodb-sink.jar --mongodb.collectionExpression=
```

4.12 MQTT Sink

This module sends messages to MQTT.

Input

Headers:

Payload:

- `byte[]`
- `String`

Output

N/A

Options

The **mqtt** sink has the following options:

mqtt.async
: whether or not to use async sends **(Boolean, default: `false`)**

mqtt.charset
: the charset used to convert a String payload to byte[] **(String, default: `UTF-8`)**

mqtt.clean-session
: whether the client and server should remember state across restarts and reconnects **(Boolean, default: `true`)**

mqtt.client-id
: identifies the client **(String, default: `stream.client.id.sink`)**

mqtt.connection-timeout
: the connection timeout in seconds **(Integer, default: `30`)**

mqtt.keep-alive-interval
: the ping interval in seconds **(Integer, default: `60`)**

mqtt.password
: the password to use when connecting to the broker **(String, default: `guest`)**

mqtt.persistence
: 'memory' or 'file' **(String, default: `memory`)**

mqtt.persistence-directory
: Persistence directory **(String, default: `/tmp/paho`)**

mqtt.qos
: the quality of service to use **(Integer, default: `1`)**

mqtt.retained
: whether to set the 'retained' flag **(Boolean, default: `false`)**

mqtt.topic
: the topic to which the sink will publish **(String, default: `stream.mqtt`)**

mqtt.url
: location of the mqtt broker(s) (comma-delimited list) **(String[], default: `[tcp://localhost:1883]`)**

mqtt.username
: the username to use when connecting to the broker **(String, default: `guest`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar mqtt-sink.jar --mqtt.clientid= --mqtt.topic=
```

4.13 Pgcopy Sink

A module that writes its incoming payload to an RDBMS using the PostgreSQL COPY command.

Input

Headers

Payload

- Any

Column expression will be evaluated against the message and the expression will usually be compatible with only one type (such as a Map or bean etc.)

Output

N/A

Options

The **jdbc** sink has the following options:

pgcopy.batch-size
: Threshold in number of messages when data will be flushed to database table. **(Integer, default: `10000`)**

pgcopy.columns
: The names of the columns that shall receive data. Also used at initialization time to issue the DDL. **(List<String>, default: `payload`)**

pgcopy.delimiter
: Specifies the character that separates columns within each row (line) of the file. The default is a tab character in text format, a comma in CSV format. This must be a single one-byte character. Using an escaped value like '\t' is allowed. **(String, default: <none>)**

pgcopy.error-table
: The name of the error table used for writing rows causing errors. The error table should have three columns named "table_name", "error_message" and "payload" large enough to hold potential data values. You can use the following DDL to create this table: 'CREATE TABLE ERRORS (TABLE_NAME VARCHAR(255), ERROR_MESSAGE TEXT,PAYLOAD TEXT)' **(String, default: <none>)**

pgcopy.escape
: Specifies the character that should appear before a data character that matches the QUOTE value. The default is the same as the QUOTE value (so that the quoting character is doubled if it appears in the data). This must be a single one-byte character. This option is allowed only when using CSV format. **(Character, default: <none>)**

pgcopy.format
: Format to use for the copy command. **(Format, default: <none>, possible values: `TEXT`,`CSV`)**

pgcopy.idle-timeout
: Idle timeout in milliseconds when data is automatically flushed to database table. **(Long, default: `-1`)**

pgcopy.initialize
: 'true', 'false' or the location of a custom initialization script for the table. **(String, default: `false`)**

pgcopy.null-string
: Specifies the string that represents a null value. The default is \N (backslash-N) in text format, and an unquoted empty string in CSV format. **(String, default: <none>)**

pgcopy.quote
: Specifies the quoting character to be used when a data value is quoted. The default is double-quote. This must be a single one-byte character. This option is allowed only when using CSV format. **(Character, default: <none>)**

pgcopy.table-name
: The name of the table to write into. **(String, default: <none>)**

spring.datasource.driver-class-name
: Fully qualified name of the JDBC driver. Auto-detected based on the URL by default. **(String, default: <none>)**

spring.datasource.password
: Login password of the database. **(String, default: <none>)**

spring.datasource.url
: JDBC url of the database. **(String, default: <none>)**

spring.datasource.username
: Login username of the database. **(String, default: <none>)**

Note

The module also uses Spring Boot's DataSource support for configuring the database connection, so properties like `spring.datasource.url` *etc.* apply.

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

For integration tests to run, start a PostgreSQL database on localhost:

```
    docker run -e POSTGRES_PASSWORD=spring -e POSTGRES_DB=test -p 5432:5432 -d postgres:latest
```

Examples

```
java -jar pgcopy-sink.jar --tableName=names --columns=name --spring.datasource.driver-class-
name=org.mariadb.jdbc.Driver \
--spring.datasource.url='jdbc:mysql://localhost:3306/test
```

4.14 Redis Sink

This module sends messages to Redis store.

Input

Headers

- `content-type: text/plain`

Payload

- `String`

Headers

- `content-type: application/octet-stream`

Payload

- `byte[]`

Output

N/A

Options

The **redis** sink has the following options:

redis.key
: A literal key name to use when storing to a key. **(String, default: <none>)**

redis.key-expression
: A SpEL expression to use for storing to a key. **(Expression, default: <none>)**

redis.queue
: A literal queue name to use when storing in a queue. **(String, default: <none>)**

redis.queue-expression
: A SpEL expression to use for queue. **(Expression, default: <none>)**

redis.topic
: A literal topic name to use when publishing to a topic. **(String, default: <none>)**

redis.topic-expression
: A SpEL expression to use for topic. **(Expression, default: <none>)**

spring.redis.database
: Database index used by the connection factory. **(Integer, default: `0`)**

spring.redis.host
: Redis server host. **(String, default: `localhost`)**

spring.redis.jedis.pool.max-active
: Maximum number of connections that can be allocated by the pool at a given time. Use a negative value for no limit. **(Integer, default: 8)**

spring.redis.jedis.pool.max-idle
: Maximum number of "idle" connections in the pool. Use a negative value to indicate an unlimited number of idle connections. **(Integer, default: 8)**

spring.redis.jedis.pool.max-wait
: Maximum amount of time a connection allocation should block before throwing an exception when the pool is exhausted. Use a negative value to block indefinitely. **(Duration, default: `-1ms`)**

spring.redis.jedis.pool.min-idle
: Target for the minimum number of idle connections to maintain in the pool. This setting only has an effect if it is positive. **(Integer, default: `0`)**

spring.redis.lettuce.pool.max-active
: Maximum number of connections that can be allocated by the pool at a given time. Use a negative value for no limit. **(Integer, default: 8)**

spring.redis.lettuce.pool.max-idle
: Maximum number of "idle" connections in the pool. Use a negative value to indicate an unlimited number of idle connections. **(Integer, default: 8)**

spring.redis.lettuce.pool.max-wait
: Maximum amount of time a connection allocation should block before throwing an exception when the pool is exhausted. Use a negative value to block indefinitely. **(Duration, default: `-1ms`)**

spring.redis.lettuce.pool.min-idle
: Target for the minimum number of idle connections to maintain in the pool. This setting only has an effect if it is positive. **(Integer, default: `0`)**

spring.redis.password
: Login password of the redis server. **(String, default: <none>)**

spring.redis.port
: Redis server port. **(Integer, default: `6379`)**

spring.redis.sentinel.master
: Name of the Redis server. **(String, default: <none>)**

spring.redis.sentinel.nodes
: Comma-separated list of "host:port" pairs. **(List<String>, default: <none>)**

spring.redis.ssl
: Whether to enable SSL support. **(Boolean, default: `false`)**

spring.redis.timeout
: Connection timeout. **(Duration, default: <none>)**

spring.redis.url
: Connection URL. Overrides host, port, and password. User is ignored. Example: redis://user:password@example.com:6379 **(String, default: <none>)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar redis-pubsub-sink.jar --redis.queue=
java -jar redis-pubsub-sink.jar --redis.queueExpression=
java -jar redis-pubsub-sink.jar --redis.key=
java -jar redis-pubsub-sink.jar --redis.keyExpression=
java -jar redis-pubsub-sink.jar --redis.topic=
java -jar redis-pubsub-sink.jar --redis.topicExpression=
```

4.15 Router Sink

This application routes messages to named channels.

Input

Headers

Payload

Any

Output

N/A

Options

Options

The **router** sink has the following options:

router.default-output-channel
: Where to send unroutable messages. **(String, default: `nullChannel`)**

router.destination-mappings
: Destination mappings as a new line delimited string of name-value pairs, e.g. 'foo=bar\n baz=car'. **(Properties, default: <none>)**

router.expression
: The expression to be applied to the message to determine the channel(s) to route to. Note that the payload wire format for content types such as text, json or xml is byte[] not String!. Consult the documentation for how to handle byte array payload content. **(Expression, default: <none>)**

router.refresh-delay
: How often to check for script changes in ms (if present); < 0 means don't refresh. **(Integer, default: `60000`)**

router.resolution-required
: Whether or not channel resolution is required. **(Boolean, default: `false`)**

router.script
: The location of a groovy script that returns channels or channel mapping resolution keys. **(Resource, default: <none>)**

router.variables
: Variable bindings as a new line delimited string of name-value pairs, e.g. 'foo=bar\n baz=car'. **(Properties, default: <none>)**

router.variables-location
: The location of a properties file containing custom script variable bindings. **(Resource, default: <none>)**

Note

Since this is a dynamic router, destinations are created as needed; therefore, by default the `defaultOutputChannel` and `resolutionRequired` will only be used if the `Binder` has some problem binding to the destination.

You can restrict the creation of dynamic bindings using the `spring.cloud.stream.dynamicDestinations` property. By default, all resolved destinations will be bound dynamically; if this property has a comma-delimited list of destination names, only those will be bound. Messages that resolve to a destination that is not in this list will be routed to the `defaultOutputChannel`, which must also appear in the list.

`destinationMappings` are used to map the evaluation results to an actual destination name.

SpEL-based Routing

The expression evaluates against the message and returns either a channel name, or the key to a map of channel names.

For more information, please see the "Routers and the Spring Expression Language (SpEL)" subsection in the Spring Integration Reference manual Configuring (Generic) Router section.

Note

Starting with Spring Cloud Stream 2.0 onwards the message wire format for `json`, `text` and `xml` content types is `byte[]` not `String`! This is an altering change from SCSt 1.x that treats those types as Strings! Depends on the content type, different techniques for handling the `byte[]` payloads are available. For plain `text` content types, one can covert the octet payload into string using the `new String(payload)` SpEL expression. For `json` types the jsonPath() SpEL utility already supports string and byte array content interchangeably. Same applies for the `xml` content type and the #xpath() SpEL utility.

For example for `text` content type one should use:

```
new String(payload).contains('a')
```

and for `json` content type SpEL expressions like this:

```
#jsonPath(payload, '$.person.name')
```

Groovy-based Routing

Instead of SpEL expressions, Groovy scripts can also be used. Let's create a Groovy script in the file system at "file:/my/path/router.groovy", or "classpath:/my/path/router.groovy" :

```
println("Groovy processing payload '" + payload + "'");
if (payload.contains('a')) {
    return "foo"
}
else {
    return "bar"
}
```

If you want to pass variable values to your script, you can statically bind values using the *variables* option or optionally pass the path to a properties file containing the bindings using the *propertiesLocation* option. All properties in the file will be made available to the script as variables. You may specify both *variables* and *propertiesLocation*, in which case any duplicate values provided as *variables* override values provided in *propertiesLocation*. Note that *payload* and *headers* are implicitly bound to give you access to the data contained in a message.

For more information, see the Spring Integration Reference manual Groovy Support.

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar router-sink.jar --expression="new String(payload).contains('a')?':foo':':bar'"
java -jar router-sink.jar --script=" "
```

4.16 Amazon S3 Sink

This sink app supports transfer files to the Amazon S3 bucket. Files payloads (and directories recursively) are transferred to the `remote` directory (S3 bucket) to the `local` directory where the application is deployed.

Messages accepted by this sink must contain `payload` as:

- `File`, including directories for recursive upload;
- `InputStream`;
- `byte[]`

When using `--mode=lines`, you can also provide the additional option `--withMarkers=true`. If set to `true`, the underlying `FileSplitter` will emit additional *start-of-file* and *end-of-file* marker messages before and after the actual data. The payload of these 2 additional marker messages is of type `FileSplitter.FileMarker`. The option `withMarkers` defaults to `false` if not explicitly set.

Input

Headers

N/A

Payload

- `java.io.File`
- `java.io.InputStream`
- `byte[]`
- `String`

Output

N/A

Options

The **s3** sink has the following options:

s3.acl
: S3 Object access control list. **(CannedAccessControlList, default: <none>, possible values: `private`,`public-read`,`public-read-write`,`authenticated-read`,`log-delivery-write`,`bucket-owner-read`,`bucket-owner-full-control`,`aws-exec-read`)**

s3.acl-expression
: Expression to evaluate S3 Object access control list. **(Expression, default: <none>)**

s3.bucket
: AWS bucket for target file(s) to store. **(String, default: <none>)**

s3.bucket-expression
: Expression to evaluate AWS bucket name. **(Expression, default: <none>)**

s3.key-expression
: Expression to evaluate S3 Object key. **(Expression, default: <none>)**

The target generated application based on the `AmazonS3SinkConfiguration` can be enhanced with the `S3MessageHandler.UploadMetadataProvider` and/or `S3ProgressListener`, which are injected into `S3MessageHandler` bean.

Amazon AWS common options

The Amazon S3 Sink (as all other Amazon AWS applications) is based on the Spring Cloud AWS project as a foundation, and its auto-configuration classes are used automatically by Spring Boot. Consult their documentation regarding required and useful auto-configuration properties.

Some of them are about AWS credentials:

- cloud.aws.credentials.accessKey
- cloud.aws.credentials.secretKey
- cloud.aws.credentials.instanceProfile
- cloud.aws.credentials.profileName
- cloud.aws.credentials.profilePath

Other are for AWS `Region` definition:

- cloud.aws.region.auto
- cloud.aws.region.static

And for AWS `Stack`:

- cloud.aws.stack.auto
- cloud.aws.stack.name

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar s3-sink.jar --s3.bucket=/tmp/bar
```

4.17 SFTP Sink

SFTP sink is a simple option to push files to an SFTP server from incoming messages.

It uses an `sftp-outbound-adapter`, therefore incoming messages can be either a `java.io.File` object, a `String` (content of the file) or an array of `bytes` (file content as well).

To use this sink, you need a username and a password to login.

Note

By default Spring Integration will use `o.s.i.file.DefaultFileNameGenerator` if none is specified. `DefaultFileNameGenerator` will determine the file name based on the value of the `file_name` header (if it exists) in the `MessageHeaders`, or if the payload of the `Message` is already a `java.io.File`, then it will use the original name of that file.

When configuring the `sftp.factory.known-hosts-expression` option, the root object of the evaluation is the application context, an example might be `sftp.factory.known-hosts-expression = @systemProperties['user.home'] + '/.ssh/known_hosts'`.

Input

Headers

- `file_name` (See note above)

Payload

- `java.io.File`
- `java.io.InputStream`
- `byte[]`
- `String`

Output

N/A (writes to the SFTP server).

Options

The **sftp** sink has the following options:

sftp.auto-create-dir
: Whether or not to create the remote directory. **(Boolean, default: `true`)**

sftp.factory.allow-unknown-keys
: True to allow an unknown or changed key. **(Boolean, default: `false`)**

sftp.factory.cache-sessions
Cache sessions **(Boolean, default: <none>)**

sftp.factory.host
The host name of the server. **(String, default: `localhost`)**

sftp.factory.known-hosts-expression
A SpEL expression resolving to the location of the known hosts file. **(Expression, default: <none>)**

sftp.factory.pass-phrase
Passphrase for user's private key. **(String, default: `<empty string>`)**

sftp.factory.password
The password to use to connect to the server. **(String, default: <none>)**

sftp.factory.port
The port of the server. **(Integer, default: `22`)**

sftp.factory.private-key
Resource location of user's private key. **(Resource, default: <none>)**

sftp.factory.username
The username to use to connect to the server. **(String, default: <none>)**

sftp.filename-expression
A SpEL expression to generate the remote file name. **(Expression, default: <none>)**

sftp.mode
Action to take if the remote file already exists. **(FileExistsMode, default: <none>, possible values: `APPEND`,`APPEND_NO_FLUSH`,`FAIL`,`IGNORE`,`REPLACE`,`REPLACE_IF_MODIFIED`)**

sftp.remote-dir
The remote FTP directory. **(String, default: `/`)**

sftp.remote-file-separator
The remote file separator. **(String, default: `/`)**

sftp.temporary-remote-dir
A temporary directory where the file will be written if 'isUseTemporaryFilename()' is true. **(String, default: `/`)**

sftp.tmp-file-suffix
The suffix to use while the transfer is in progress. **(String, default: `.tmp`)**

sftp.use-temporary-filename
Whether or not to write to a temporary file and rename. **(Boolean, default: `true`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar sftp_sink.jar --sftp.remote-dir=bar --sftp.factory.host=sftpserver \
         --sftp.factory.username=user --sftp.factory.password=pw
```

4.18 TCP Sink

This module writes messages to TCP using an Encoder.

TCP is a streaming protocol and some mechanism is needed to frame messages on the wire. A number of encoders are available, the default being 'CRLF'.

Input

Headers:

- `Content-Type: application/octet-stream`

Payload:

- `byte[]`

Headers:

- `Content-Type: text/plain`

Payload:

- `String`

Output

N/A

Options

The **tcp** sink has the following options:

tcp.charset
: The charset used when converting from bytes to String. **(String, default: `UTF-8`)**

tcp.close
: Whether to close the socket after each message. **(Boolean, default: `false`)**

tcp.encoder
: The encoder to use when sending messages. **(Encoding, default: <none>, possible values: `CRLF`,`LF`,`NULL`,`STXETX`,`RAW`,`L1`,`L2`,`L4`)**

tcp.host
: The host to which this sink will connect. **(String, default: <none>)**

tcp.nio
: Whether or not to use NIO. **(Boolean, default: `false`)**

tcp.port
: The port on which to listen; 0 for the OS to choose a port. **(Integer, default: `1234`)**

tcp.reverse-lookup
: Perform a reverse DNS lookup on the remote IP Address; if false, just the IP address is included in the message headers. **(Boolean, default: `false`)**

tcp.socket-timeout
: The timeout (ms) before closing the socket when no data is received. **(Integer, default: `120000`)**

tcp.use-direct-buffers
: Whether or not to use direct buffers. **(Boolean, default: `false`)**

Available Encoders

Text Data

CRLF (default)
: text terminated by carriage return (0x0d) followed by line feed (0x0a)

LF
: text terminated by line feed (0x0a)

NULL
: text terminated by a null byte (0x00)

STXETX
: text preceded by an STX (0x02) and terminated by an ETX (0x03)

Text and Binary Data

RAW
: no structure - the client indicates a complete message by closing the socket

L1
: data preceded by a one byte (unsigned) length field (supports up to 255 bytes)

L2
: data preceded by a two byte (unsigned) length field (up to 2^{16}-1 bytes)

L4
: data preceded by a four byte (signed) length field (up to 2^{31}-1 bytes)

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar tcp_sink.jar --tcp.encoder=LF
```

4.19 Throughput Sink

A simple handler that will count messages and log witnessed throughput at a selected interval.

Input

Headers

Payload

Any

Output

N/A

Options

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

```
java -jar throughput-sink.jar
```

4.20 Websocket Sink

A simple Websocket Sink implementation.

Input

Headers

Payload

Any

Output

N/A

Options

The following commmand line arguments are supported:

websocket.log-level
: the logLevel for netty channels. Default is <tt>WARN</tt> **(String, default: <none>)**

websocket.path
: the path on which a WebsocketSink consumer needs to connect. Default is <tt>/websocket</tt> **(String, default: `/websocket`)**

websocket.port
: the port on which the Netty server listens. Default is <tt>9292</tt> **(Integer, default: `9292`)**

websocket.ssl
: whether or not to create a {@link io.netty.handler.ssl.SslContext} **(Boolean, default: `false`)**

websocket.threads
: the number of threads for the Netty {@link io.netty.channel.EventLoopGroup}. Default is <tt>1</tt> **(Integer, default: `1`)**

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

To verify that the websocket-sink receives messages from other spring-cloud-stream apps, you can use the following simple end-to-end setup.

Step 1: Start Rabbitmq

Step 2: Deploy a `time-source`

Step 3: Deploy a `websocket-sink` (the app that contains this starter jar)

Finally start a websocket-sink in `trace` mode so that you see the messages produced by the `time-source` in the log:

```
java -jar <spring boot application for websocket-sink> --spring.cloud.stream.bindings.input=ticktock --
server.port=9393 \
 --logging.level.org.springframework.cloud.stream.module.websocket=TRACE
```

You should start seeing log messages in the console where you started the WebsocketSink like this:

```
Handling message: GenericMessage [payload=2015-10-21 12:52:53, headers={id=09ae31e0-a04e-b811-d211-
b4d4e75b6f29, timestamp=1445424778065}]
Handling message: GenericMessage [payload=2015-10-21 12:52:54, headers={id=75eaaf30-e5c6-494f-
b007-9d5b5b920001, timestamp=1445424778065}]
Handling message: GenericMessage [payload=2015-10-21 12:52:55, headers={id=18b887db-81fc-
c634-7a9a-16b1c72de291, timestamp=1445424778066}]
```

Actuators

There is an `Endpoint` that you can use to access the last n messages sent and received. You have to enable it by providing `--endpoints.websocketsinktrace.enabled=true`. By default it shows the last 100 messages via the `host:port/websocketsinktrace`. Here is a sample output:

```
[
  {
   "timestamp": 1445453703508,
   "info": {
     "type": "text",
     "direction": "out",
     "id": "2ff9be50-c9b2-724b-5404-1a6305c033e4",
     "payload": "2015-10-21 20:54:33"
   }
 },
 ...
 {
   "timestamp": 1445453703506,
   "info": {
     "type": "text",
     "direction": "out",
     "id": "2b9dbcaf-c808-084d-a51b-50f617ae6a75",
     "payload": "2015-10-21 20:54:32"
   }
 }
]
```

There is also a simple HTML page where you see forwarded messages in a text area. You can access it directly via `host:port` in your browser

Note

For SSL mode (`--ssl=true`) a self signed certificate is used that might cause troubles with some Websocket clients. In a future release, there will be a `--certificate=mycert.cer` switch to pass a valid (not self-signed) certificate.

4.21 TaskLauncher Data Flow Sink

This application launches a registered task application using the Data Flow Server REST API.

Input

Launch request args including:

- the task name (required and registered as a task with the target Data Flow Server)
- deployment properties (key value pairs, optional).
- program arguments for the task (a list, optional).

Headers:

- `Content-Type: application/json`

Payload:

A JSON document:

```
{
  "name":"foo",
  "deploymentProps": {"key1":"val1","key2":"val2"},
  "args":["--debug", "--foo", "bar"]
}
```

minimally,

```
{"name":"foo"}
```

Output

N/A (launches task to the local system).

Options

The **tasklauncher-dataflow** sink supports the following configuration properties:

spring.cloud.dataflow.client.authentication.basic.password
: The login password. **(String, default: <none>)**

spring.cloud.dataflow.client.authentication.basic.username
: The login username. **(String, default: <none>)**

spring.cloud.dataflow.client.enable-dsl
: Enable Data Flow DSL access. **(Boolean, default: `false`)**

spring.cloud.dataflow.client.server-uri
: The Data Flow server URI. **(String, default: `http://localhost:9393`)**

spring.cloud.dataflow.client.skip-ssl-validation
: Skip Ssl validation. **(Boolean, default: `true`)**

trigger.initial-delay
: The initial delay in milliseconds. **(Integer, default: `1000`)**

trigger.max-period
: The maximum polling period in milliseconds. Will be set to period if period > maxPeriod. **(Integer, default: `30000`)**

trigger.period
: The polling period in milliseconds. **(Integer, default: `1000`)**

Using the TaskLauncher

A tasklauncher is a sink that consumes `LaunchRequest` messages, as described above, and launches a task using the configured Spring Cloud Data Flow server (given by `--dataflow.uri`). The task launcher periodically polls its input for launch requests but will pause when the SCDF server's concurrent task execution limit given by `spring.cloud .dataflow.task .maximum-concurrent-tasks` is reached (see the reference docs for more details).

When the number of running tasks drops below this limit message polling resumes. This is intended to prevent the SCDF deployer's deployment platform from running out of resources under heavy task load. The poller is scheduled using a `DynamicPeriodicTrigger`. By default the polling rate is 1 second, but may be configured to any duration. When paused, or if there are no launch requests, the trigger period will increase, applying exponential backoff, up to a configured maximum (30 seconds by default).

Note

When the poller is paused it puts pressure on the message broker so some tuning will be necessary in extreme cases to balance resource utilization.

Build

```
$ ./mvnw clean install -PgenerateApps
$ cd apps
```

You can find the corresponding binder based projects here. You can then cd into one one of the folders and build it:

```
$ ./mvnw clean package
```

Examples

Register a task app and create a task, the timestamp sample provides a simple demonstration.

```
dataflow:>app register --name timestamp --type task --uri ...
dataflow:>stream create http | task-launcher-dataflow-sink --deploy
```

Send a launch request,

```
$curl http://localhost:<port> -H"Content-Type:application/json" -d '{"name":"timestamp"}'
```

```
dataflow:>task execution list
###########################################################################################
#Task Name#ID#         Start Time         #          End Time          #Exit Code#
###########################################################################################
#timestamp#1 #Fri Aug 10 08:48:05 EDT 2018#Fri Aug 10 08:48:05 EDT 2018#0        #
###########################################################################################
```

Part III. Appendices

Appendix A. Building

A.1 Basic Compile and Test

To build the source you will need to install JDK 1.7.

The build uses the Maven wrapper so you don't have to install a specific version of Maven. To enable the tests for Redis you should run the server before bulding. See below for more information on how run Redis.

The main build command is

```
$ ./mvnw clean install
```

You can also add '-DskipTests' if you like, to avoid running the tests.

Note

You can also install Maven (>=3.3.3) yourself and run the `mvn` command in place of `./mvnw` in the examples below. If you do that you also might need to add `-P spring` if your local Maven settings do not contain repository declarations for spring pre-release artifacts.

Note

Be aware that you might need to increase the amount of memory available to Maven by setting a `MAVEN_OPTS` environment variable with a value like `-Xmx512m -XX:MaxPermSize=128m`. We try to cover this in the `.mvn` configuration, so if you find you have to do it to make a build succeed, please raise a ticket to get the settings added to source control.

The projects that require middleware generally include a `docker-compose.yml`, so consider using Docker Compose to run the middeware servers in Docker containers. See the README in the scripts demo repository for specific instructions about the common cases of mongo, rabbit and redis.

A.2 Documentation

There is a "full" profile that will generate documentation. You can build just the documentation by executing

```
$ ./mvnw package -DskipTests=true -P full -pl spring-cloud-stream-app-starters-docs -am
```

A.3 Working with the code

If you don't have an IDE preference we would recommend that you use Spring Tools Suite or Eclipse when working with the code. We use the m2eclipe eclipse plugin for maven support. Other IDEs and tools should also work without issue.

Importing into eclipse with m2eclipse

We recommend the m2eclipe eclipse plugin when working with eclipse. If you don't already have m2eclipse installed it is available from the "eclipse marketplace".

Unfortunately m2e does not yet support Maven 3.3, so once the projects are imported into Eclipse you will also need to tell m2eclipse to use the `.settings.xml` file for the projects. If you do not do this

you may see many different errors related to the POMs in the projects. Open your Eclipse preferences, expand the Maven preferences, and select User Settings. In the User Settings field click Browse and navigate to the Spring Cloud project you imported selecting the `.settings.xml` file in that project. Click Apply and then OK to save the preference changes.

Note

Alternatively you can copy the repository settings from `.settings.xml` into your own `~/.m2/settings.xml`.

Importing into eclipse without m2eclipse

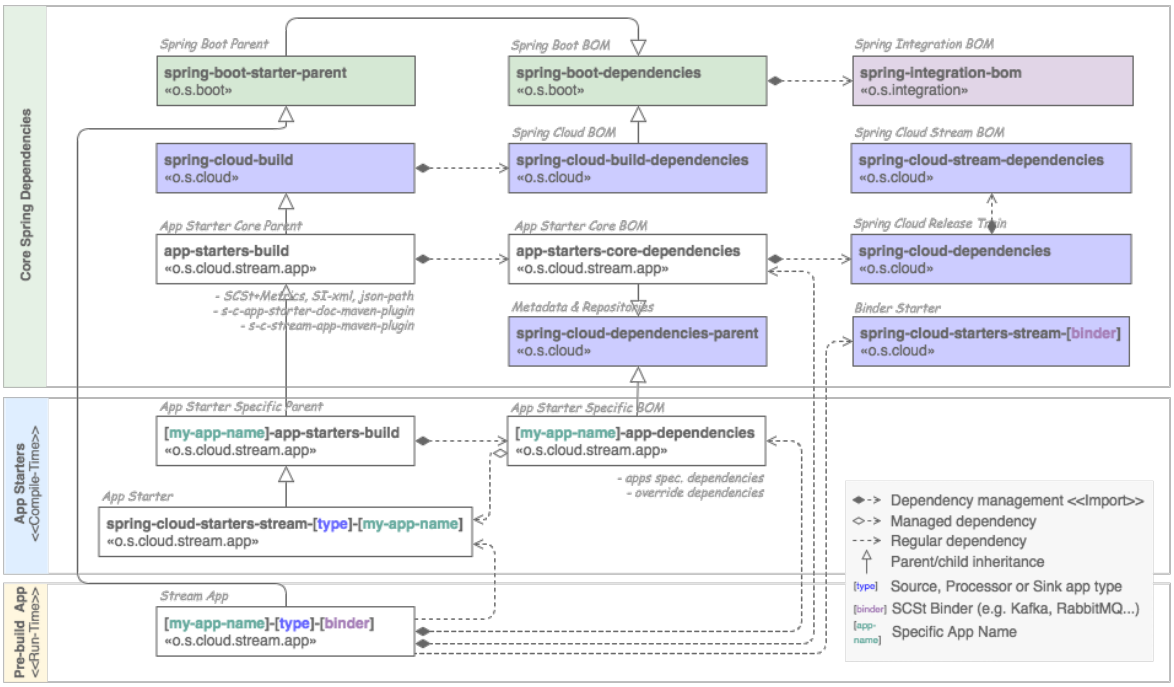
If you prefer not to use m2eclipse you can generate eclipse project metadata using the following command:

```
$ ./mvnw eclipse:eclipse
```

The generated eclipse projects can be imported by selecting `import existing projects` from the `file` menu.

Appendix B. App Starter POM Dependencies

Following diagram highlights some of the important `Stream App` and `Stream App Starter` POM dependencies.



The dependencies are grouped in three categories:

- **Core Spring libraries** - represent the core framework libraries such as `Spring Boot`, `Spring Integration`, `Spring Cloud`. The "Bill Of Materials" (BOM) patterns is used throughout the stack to decouple the dependency management from the lifecycle configurations. The `app-starters-build` parent POM and the `app-starters-core-dependencies` BOM use inherit by all app starters.
- **App Starters** - libraries that contain the complete configuration of a Spring Cloud Stream application with a specific role Starters are not executable applications, and are intended to be included in the `Pre-build Apps`, along with a Binder implementation. The App Starter root pom (`[my-app-name]-app-starters-build`) inherit all compile-tme configuration for its parent the core `app-starters-build`. Starer's BOM `[my-app-name]-app-dependencies` is used to manage starter's own dependencies.
- **Pre-build App** - pre-build Spring Boot applications that include the app starters and a Binder implementation.

Appendix C. App Starter Naming Conventions

The `spring-cloud-stream-app-maven-plugin` (used to generate the Pre-build Apps) asserts a naming convention over certain starter's resources.

Following diagram describes which resources are involved and how the convention is applied to them.

The `[type]` placeholder represents the application type and must be either `Source`, `Processor` or `Sink` values. The `[my-app-name]` placeholder represents the name of your app starter project. For multi-word app names, the hyphens (`-`) is used as word delimiter (e.g. `my-app-name`). Mind that for `package names` the hyphen delimiter is replaced by (`.`) character (e.g. `o.s.c.s.a.my.app.name`). Class name convention expects CamelCase names in place of any delimiters (e.g. `MyAppNameSourceConfiguration`.

The capital letters in the placeholders are relevant. For example the `[type]` refers to lower case names such as `source`, `processor` or `sink` types, while capitalized placeholder `[Type]` refers to names like `Source`, `Processor` and `Sink`.

The `Configuration` and `Properties` class suffixes are expected as well.

With the help of the maven plugin configuration all default conventions can be customized or replaced. More information about the maven plugin can be found here: github.com/spring-cloud/spring-cloud-stream-app-maven-plugin

5. Contributing

Spring Cloud is released under the non-restrictive Apache 2.0 license, and follows a very standard Github development process, using Github tracker for issues and merging pull requests into master. If you want to contribute even something trivial please do not hesitate, but follow the guidelines below.

5.1 Sign the Contributor License Agreement

Before we accept a non-trivial patch or pull request we will need you to sign the contributor's agreement. Signing the contributor's agreement does not grant anyone commit rights to the main repository, but it does mean that we can accept your contributions, and you will get an author credit if we do. Active contributors might be asked to join the core team, and given the ability to merge pull requests.

5.2 Code Conventions and Housekeeping

None of these is essential for a pull request, but they will all help. They can also be added after the original pull request but before a merge.

- Use the Spring Framework code format conventions. If you use Eclipse you can import formatter settings using the `eclipse-code-formatter.xml` file from the Spring Cloud Build project. If using IntelliJ, you can use the Eclipse Code Formatter Plugin to import the same file.
- Make sure all new `.java` files to have a simple Javadoc class comment with at least an `@author` tag identifying you, and preferably at least a paragraph on what the class is for.
- Add the ASF license header comment to all new `.java` files (copy from existing files in the project)
- Add yourself as an `@author` to the .java files that you modify substantially (more than cosmetic changes).
- Add some Javadocs and, if you change the namespace, some XSD doc elements.
- A few unit tests would help a lot as well — someone has to do it.
- If no-one else is using your branch, please rebase it against the current master (or other target branch in the main project).
- When writing a commit message please follow these conventions, if you are fixing an existing issue please add `Fixes gh-XXXX` at the end of the commit message (where XXXX is the issue number).