



# Spring Cloud Stream App Starters Reference Guide

Bacon.RC1

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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 predefined Spring Cloud Stream 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 and sinks) for middleware 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 Starters and 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 a Binder implementation.

*Prebuilt applications* are Spring Boot applications that include the starters and a Binder implementation. Prebuilt applications are [uberjars](#) and include minimal code required to execute standalone. For each starter, the project provides a prebuilt version including the Kafka Binder (one each for 0.9 and 0.10 versions of Kafka) and a prebuilt version including the Rabbit MQ Binder.



### 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 receive data that is sent on its sole output channel;
- a *processor* that receives data from a single input channel and processes it, sending the result on its single output channel;
- a *sink* that connects to an external resource to send data that is received on its sole 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>1.0.0.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:1.0.0.BUILD-SNAPSHOT
```

Just as with the starters, you can infer the coordinates for other prebuilt applications found in the guide. The group will be always `org.springframework.cloud.stream.app`. The version may vary. The artifact id follows the format `<functionality>-<type>-<binder>` [previously described](#).

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-1.1.1.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-10
```

will pull the *latest* Docker image of the *Cassandra sink* with the Kafka binder that is running with Kafka version 0.10.

## Building the artifacts

You can also 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 application 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 exercises the component against the configured binder.

For example, spring-cloud-starter-stream-sink-cassandra will generate cassandra-sink-rabbit, cassandra-sink-kafka-09 and cassandra-sink-kafka-10 as completely functional applications.

## 1.4 Creating 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>1.0.0.BUILD-SNAPSHOT</version>
  </dependency>
  <dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-stream-binder-gemfire</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 CassandraSinkGemfireApplication {

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

## Creating your own applications

Spring Cloud Stream Application 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;

### Using generic Spring Cloud Stream 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 [Getting Started Guide](#) of Spring Cloud Stream.

An alternative way to bootstrap your application is to 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 `input` for sources - the simplest way to do so is by using the predefined interface `org.springframework.cloud.stream.messaging.Source`;
- a single outbound channel named `output` for sinks - the simplest way to do so is by using the predefined interface `org.springframework.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.springframework.cloud.stream.messaging.Processor`.

### Using the starters to create custom components

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 simply 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 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/](http://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.springframework.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>
      </configuration>
    </plugin>
    <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>
  </plugins>
</build>
```

```

    </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](https://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.springframework.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/scs-apps`, you can do it in the configuration section of the plugin.

```

<configuration>
...
  <generatedProjectHome>/tmp/scs-apps</generatedProjectHome>
...
</configuration>

```

By default, we generate apps for both Kafka 09/10 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 (say 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 would 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-09`, `foobar-source-kafka-10` and `foobar-source-rabbit`. If you added more binders as described above, you would see that app as well here - for example `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-10

mvn clean install
```

This would install the `foo-source-kafka-10` 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>
  <extraTestClass>org.springframework.cloud.stream.app.test.foobar.FoobarTestConfiguration.class</
extraTestClass>
</foobar-source>
```

When you do the above, this test configuration will be automatically 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-10.jar [Ensure that you have 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 and `DOCKER_HOST` environment variable is properly set before you try `docker:build`.

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 would 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](https://github.com/spring-cloud-stream-app-starters)  
Project page: [cloud.spring.io/spring-cloud-stream-app-starters/](https://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](https://github.com/spring-cloud-stream-app-starters/core) For example:

```
<parent>
  <groupId>org.springframework.cloud.stream.app</groupId>
  <artifactId>app-starters-build</artifactId>
  <version>1.2.0.RC1</version>
  <relativePath/>
</parent>
```

### 3. Why is there a BOM in the core project?

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` artifact. 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 artifacts 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 starter 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](https://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**

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## 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.

#### 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.

## 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.

### 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

<documentation missing> **(Boolean, default: <none>)**

ftp.delete-remote-files

<documentation missing> **(Boolean, default: <none>)**

- 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  
<documentation missing> (**String, default: <none>**)
- ftp.filename-regex  
<documentation missing> (**Pattern, default: <none>**)
- ftp.local-dir  
<documentation missing> (**File, default: <none>**)
- ftp.preserve-timestamp  
<documentation missing> (**Boolean, default: <none>**)
- ftp.remote-dir  
<documentation missing> (**String, default: <none>**)
- ftp.remote-file-separator  
<documentation missing> (**String, default: <none>**)
- ftp.tmp-file-suffix  
<documentation missing> (**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**)

## 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.

### 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>**)

## 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.

### 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>)**

## 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.

### Options

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

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: <none>)**

## 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.

### 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. **(java.util.List<java.lang.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.initialize

Populate the database using 'data.sql'. **(Boolean, default: true)**

spring.datasource.password

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

spring.datasource.schema

Schema (DDL) script resource references. **(java.util.List<java.lang.String>, default: <none>)**

spring.datasource.url

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

spring.datasource.username

Login user 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.

## 2.7 JMS Source

The "jms" source enables receiving messages from JMS.

### 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`

Specify if 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.

## 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.

### 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**)

## 2.9 Mail Source

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

### 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.user-flag  
The flag to mark messages when the server does not support \Recent. (**String, default: spring-integration-mail-adapter**)

mail.url  
Mail connection URL for connection to Mail server e.g. 'imaps://username:password@imap.server.com:993/Inbox'. (**URLName, 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)

## 2.10 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.

### 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 (**String**, **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. (**java.lang.Class<?>**, **default:** <none>)

spring.data.mongodb.grid-fs-database

GridFS database name. (**String**, **default:** <none>)

spring.data.mongodb.host

Mongo server host. (**String**, **default:** <none>)

spring.data.mongodb.password

Login password of the mongo server. (**char[]**, **default:** <none>)

spring.data.mongodb.port

Mongo server port. (**Integer**, **default:** <none>)

spring.data.mongodb.uri

Mongo database URI. When set, host and port are ignored. (**String**, **default:** mongodb://localhost/test)

spring.data.mongodb.username

Login user of the mongo server. (**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.

## 2.11 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.

### 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.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 to. (**String, default: <none>**)

spring.rabbitmq.host

RabbitMQ host. (**String, default: localhost**)

spring.rabbitmq.password

Login to authenticate against the broker. (**String, default: <none>**)

spring.rabbitmq.port

RabbitMQ port. (**Integer, default: 5672**)

spring.rabbitmq.requested-heartbeat

Requested heartbeat timeout, in seconds; zero for none. (**Integer, default: <none>**)

spring.rabbitmq.username

Login user to authenticate to the broker. (**String, default: <none>**)

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).

## 2.12 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.

## 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`

`<documentation missing>` **(Boolean, default: `<none>`)**

`s3.delete-remote-files`

`<documentation missing>` **(Boolean, default: `<none>`)**

`s3.filename-pattern`

`<documentation missing>` **(String, default: `<none>`)**

`s3.filename-regex`

`<documentation missing>` **(Pattern, default: `<none>`)**

`s3.local-dir`

`<documentation missing>` **(File, default: `<none>`)**

`s3.preserve-timestamp`

`<documentation missing>` **(Boolean, default: `<none>`)**

`s3.remote-dir`

`<documentation missing>` **(String, default: `<none>`)**

`s3.remote-file-separator`

`<documentation missing>` **(String, default: `<none>`)**

`s3.tmp-file-suffix`

`<documentation missing>` **(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)**

## 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

## 2.13 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.

## 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`

<documentation missing> **(Boolean, default: <none>)**

`sftp.delete-remote-files`

<documentation missing> **(Boolean, default: <none>)**

`sftp.factory.allow-unknown-keys`

True to allow an unknown or changed key. **(Boolean, default: false)**

`sftp.factory.cache-sessions`

<documentation missing> **(Boolean, default: <none>)**

`sftp.factory.host`

<documentation missing> **(String, default: <none>)**

`sftp.factory.known-hosts-expression`

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

`sftp.factory.pass-phrase`

Passphrase for user's private key. **(String, default: <empty string>)**

`sftp.factory.password`

<documentation missing> **(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. **(String, default: <empty string>)**

sftp.factory.username	<documentation missing> <b>(String, default: &lt;none&gt;)</b>
sftp.filename-pattern	<documentation missing> <b>(String, default: &lt;none&gt;)</b>
sftp.filename-regex	<documentation missing> <b>(Pattern, default: &lt;none&gt;)</b>
sftp.local-dir	<documentation missing> <b>(File, default: &lt;none&gt;)</b>
sftp.preserve-timestamp	<documentation missing> <b>(Boolean, default: &lt;none&gt;)</b>
sftp.remote-dir	<documentation missing> <b>(String, default: &lt;none&gt;)</b>
sftp.remote-file-separator	<documentation missing> <b>(String, default: &lt;none&gt;)</b>
sftp.tmp-file-suffix	<documentation missing> <b>(String, default: &lt;none&gt;)</b>
trigger.cron	Cron expression value for the Cron Trigger. <b>(String, default: &lt;none&gt;)</b>
trigger.date-format	Format for the date value. <b>(String, default: &lt;none&gt;)</b>
trigger.fixed-delay	Fixed delay for periodic triggers. <b>(Integer, default: 1)</b>
trigger.initial-delay	Initial delay for periodic triggers. <b>(Integer, default: 0)</b>
trigger.max-messages	Maximum messages per poll, -1 means infinity. <b>(Long, default: -1)</b>
trigger.time-unit	The TimeUnit to apply to delay values. <b>(TimeUnit, default: SECONDS, possible values: NANOSECONDS, MICROSECONDS, MILLISECONDS, SECONDS, MINUTES, HOURS, DAYS)</b>

## 2.14 SYSLOG Source

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

### Options

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

syslog.buffer-size	the buffer size used when decoding messages; larger messages will be rejected. <b>(Integer, default: 2048)</b>
--------------------	--

- `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`**)

## 2.15 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.

### 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`  
<documentation missing> (**Boolean, default: `<none>`**)
- `tcp.port`  
<documentation missing> (**Integer, default: `<none>`**)
- `tcp.reverse-lookup`  
<documentation missing> (**Boolean, default: `<none>`**)
- `tcp.socket-timeout`  
<documentation missing> (**Integer, default: `<none>`**)
- `tcp.use-direct-buffers`  
<documentation missing> (**Boolean, default: `<none>`**)

## 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)

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

### 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

<documentation missing> **(Boolean, default: <none>)**

#### tcp.port

<documentation missing> **(Integer, default: <none>)**

tcp.retry-interval

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

tcp.reverse-lookup

<documentation missing> **(Boolean, default: <none>)**

tcp.socket-timeout

<documentation missing> **(Integer, default: <none>)**

tcp.use-direct-buffers

<documentation missing> **(Boolean, default: <none>)**

## 2.17 Time Source

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

### 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)**

## 2.18 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.

### 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)**

## 2.19 TriggerTask Source

The TriggerTask app sends a `TaskLaunchRequest` based on a fixed delay, date or cron expression. The user is allowed to set the command line arguments as well as the [Spring Boot properties](#) that are used by the task.

### 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>)**

## Using the triggertask

A trigger task is a source that dispatches `TaskLaunchRequest` messages that will eventually be consumed by a `tasklauncher-*` sink. The `tasklauncher-*` sink will then deploy a task and launch it. An example of this using Spring Cloud Data Flow would look like this:

```
stream create foo --definition "triggertask --uri=maven://org.springframework.cloud.task.app:timestamp-task:jar:1.1.0.RELEASE --fixed-delay=5 | task-launcher-local" --deploy
```

In the case above the `tasklauncher-local` will receive the `TaskLaunchRequest` and launch the task enumerated in the `--uri` property using the Spring Cloud Local Deployer.

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.



### Note

When using the `tasklauncher-*` and the URI uses maven as the resource please be sure to set the `--maven.remote-repositories` property for the `tasklauncher-*`, if the jar is not in your local repository. For example:

```
stream create foo --definition "triggertask --uri=maven://org.springframework.cloud.task.app:timestamp-task:jar:1.0.1.RELEASE --fixed-delay=5 | task-launcher-local --maven.remote-repositories.repo1.url=http://repo.spring.io/libs-snapshot" --deploy
```

## 2.20 Twitter Stream Source

This source ingests data from Twitter's [streaming API v1.1](#). 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`.

### 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.language

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

twitter.stream.stream-type

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



**Note**

twitterstream emit JSON in the [native Twitter format](#).

## 3. Processors

Unresolved directive in processors.adoc - include::https://raw.githubusercontent.com/spring-cloud-stream-app-starters/aggregator/master/spring-cloud-starter-stream-aggregator/README.adoc[tags=ref-doc]

### 3.1 Bridge Processor

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

### 3.2 Filter Processor

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

#### 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)**

### 3.3 Groovy Filter Processor

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

#### 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>)**

### 3.4 Groovy Transform Processor

A Processor module that transforms messages using a Groovy script.

#### 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>)**

## 3.5 Header Enricher Processor

Use the header-enricher app to add message headers.

The headers are provided in the form of a JSON map document, where the keys are the header names and the values are SpEL expressions. For example `--headers='foo=payload.someProperty \n bar=payload.otherProperty'`

### Options

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

headerenricher.headers

\n separated properties representing headers in which values are SpEL expressions, e.g. `foo='bar'\nbaz=payload.baz` **(String, default: none)**

headerenricher.overwrite

set to true to overwrite any existing message headers **(boolean, default: false)**

## 3.6 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.

### 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. **(java.lang.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.reply-expression

A SpEL expression used to compute the final result, applied against the whole http response. (**Expression**, **default:** **body**)

httpClient.url-expression

A SpEL expression against incoming message to determine the URL to use. (**Expression**, **default:** <none>)

## 3.7 PMML Processor

A processor that evaluates a machine learning model stored in PMML format.

### Options

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

pmml.inputs

How to compute model active fields from input message properties as modelField->SpEL. (**java.util.Map<java.lang.String,org.springframework.expression.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. (**java.util.Map<java.lang.String,org.springframework.expression.Expression>**, **default:** <none>)

## 3.8 Scribable 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).

### 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>)**

## 3.9 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.

### 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.

## 3.10 TCP Client as a processor which connects to a TCP server, sends data to it and also receives data.

### 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

<documentation missing> **(Boolean, default: <none>)**

tcp.port

<documentation missing> **(Integer, default: <none>)**

tcp.retry-interval

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

tcp.reverse-lookup

<documentation missing> **(Boolean, default: <none>)**

tcp.socket-timeout

<documentation missing> **(Integer, default: <none>)**

tcp.use-direct-buffers

<documentation missing> **(Boolean, default: <none>)**

## 3.11 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. For example, `--expression=payload.toUpperCase()`.

This transform will convert all message payloads to upper case.

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>')`

### Options

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

transformer.expression

<documentation missing> **(Expression, default: payload)**



## 4. Sinks

### 4.1 Aggregate Counter Sink

The aggregate counter differs from a simple counter in that it not only keeps a total value for the count, but also retains the total count values for each minute, hour day and month of the period for which it is run. The data can then be queried by supplying a start and end date and the resolution at which the data should be returned.

#### Options

The **aggregate-counter** sink has the following options:

aggregate-counter.date-format

<documentation missing> **(String, default: yyyy-MM-dd'T'HH:mm:ss.SSS'Z')**

aggregate-counter.increment-expression

Increment value for each bucket as a SpEL against the message **(Expression, default: <none>)**

aggregate-counter.name

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

aggregate-counter.name-expression

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

aggregate-counter.time-field

A SpEL expression (against the incoming Message) to derive the timestamp value. **(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.password

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

spring.redis.port

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

spring.redis.ssl

Enable SSL. **(Boolean, default: false)**

spring.redis.timeout

Connection timeout in milliseconds. **(Integer, default: 0)**

spring.redis.url

Redis url, which will overrule host, port and password if set. **(String, default: <none>)**

### 4.2 Cassandra Sink

This sink application writes the content of each message it receives into Cassandra.

## Options

The **cassandra** sink has the following options:

`cassandra.cluster.compression-type`

The compression to use for the transport. (**CompressionType**, default: `<none>`, possible values: **NONE,SNAPPY**)

`cassandra.cluster.contact-points`

The comma-delimited string of the hosts to connect to Cassandra. (**String**, default: `<none>`)

`cassandra.cluster.create-keyspace`

The flag to create (or not) keyspace on application startup. (**Boolean**, default: `false`)

`cassandra.cluster.entity-base-packages`

The base packages to scan for entities annotated with Table annotations. (**String[]**, default: `[]`)

`cassandra.cluster.init-script`

The resource with CQL scripts (delimited by ';') to initialize keyspace schema. (**Resource**, default: `<none>`)

`cassandra.cluster.keyspace`

The keyspace name to connect to. (**String**, default: `<none>`)

`cassandra.cluster.metrics-enabled`

Enable/disable metrics collection for the created cluster. (**Boolean**, default: `<none>`)

`cassandra.cluster.password`

The password for connection. (**String**, default: `<none>`)

`cassandra.cluster.port`

The port to use to connect to the Cassandra host. (**Integer**, default: `<none>`)

`cassandra.cluster.schema-action`

The schema action to perform. (**SchemaAction**, default: `<none>`, possible values: **NONE,CREATE,RECREATE,RECREATE\_DROP\_UNUSED**)

`cassandra.cluster.username`

The username for connection. (**String**, default: `<none>`)

`cassandra.consistency-level`

The consistencyLevel option of WriteOptions. (**ConsistencyLevel**, default: `<none>`, possible values:

**ANY,ONE,TWO,THREE,QUOROM,LOCAL\_QUOROM,EACH\_QUOROM,ALL,LOCAL\_ONE,SERIAL,LOCAL\_SERIAL**)

`cassandra.ingest-query`

The ingest Cassandra query. (**String**, default: `<none>`)

`cassandra.query-type`

The `queryType` for Cassandra Sink. (**org.springframework.integration.cassandra.outbound.CassandraMessageHandler<T>** `$Type`, default: `<none>`)

`cassandra.retry-policy`

The retryPolicy option of WriteOptions. (**RetryPolicy**, default: `<none>`, possible values: **DEFAULT,DOWNGRADING\_CONSISTENCY,FALLTHROUGH,LOGGING**)

cassandra.statement-expression

The expression in Cassandra query DSL style. **(Expression, default: <none>)**

cassandra.ttl

The time-to-live option of WriteOptions. **(Integer, default: 0)**

## 4.3 Counter Sink

The counter sink simply counts the number of messages it receives, optionally storing counts in a separate store such as redis.

### Options

The **counter** sink has the following options:

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>)**

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.timeout

Connection timeout in milliseconds. **(Integer, default: 0)**

## 4.4 Field Value Counter Sink

A field value counter is a Metric used for counting occurrences of unique values for a named field in a message payload. This sinks supports the following payload types out of the box:

- POJO (Java bean)
- Tuple
- JSON String

For example suppose a message source produces a payload with a field named *user* :

```
class Foo {
    String user;
    public Foo(String user) {
        this.user = user;
    }
}
```

If the stream source produces messages with the following objects:

```
new Foo("fred")
new Foo("sue")
new Foo("dave")
new Foo("sue")
```

The field value counter on the field *user* will contain:

```
fred:1, sue:2, dave:1
```

Multi-value fields are also supported. For example, if a field contains a list, each value will be counted once:

```
users: ["dave", "fred", "sue"]
users: ["sue", "jon"]
```

The field value counter on the field *users* will contain:

```
dave:1, fred:1, sue:2, jon:1
```

## Options

The **field-value-counter** sink has the following options:

field-value-counter.field-name

<documentation missing> **(String, default: <none>)**

field-value-counter.name

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

field-value-counter.name-expression

A SpEL expression (against the incoming Message) to derive the name of the counter to increment. **(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.password

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

spring.redis.port

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

spring.redis.ssl

Enable SSL. **(Boolean, default: false)**

spring.redis.timeout

Connection timeout in milliseconds. **(Integer, default: 0)**

spring.redis.url

Redis url, which will overrule host, port and password if set. **(String, default: <none>)**

## 4.5 File Sink

This module writes each message it receives to a file.

## Options

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

`file.binary`

A flag to indicate whether content should be written as bytes. **(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`)**

`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>`)**

## 4.6 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.

## Options

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

`ftp.auto-create-dir`

`<documentation missing>` **(Boolean, default: `<none>`)**

`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

<documentation missing> (**Expression**, default: <none>)

ftp.mode

<documentation missing> (**FileExistsMode**, default: <none>, possible values: **APPEND,APPEND\_NO\_FLUSH,FAIL,IGNORE,REPLACE**)

ftp.remote-dir

<documentation missing> (**String**, default: <none>)

ftp.remote-file-separator

<documentation missing> (**String**, default: <none>)

ftp.temporary-remote-dir

<documentation missing> (**String**, default: <none>)

ftp.tmp-file-suffix

<documentation missing> (**String**, default: <none>)

ftp.use-temporary-filename

<documentation missing> (**Boolean**, default: <none>)

## 4.7 Gemfire Sink

The Gemfire sink allows one to write message payloads to a Gemfire server.

### 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>**)

## 4.8 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* protocol and schedules a task that orchestrates a *gpload* 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.

### 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.error-table`  
Tablename to log errors. (String, default: ``) **(String, default: <none>)**
- `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.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: ``) **(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 (**java.util.List<java.lang.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 INTO error_table] SEGMENT REJECT LIMIT count  
[ROWS | PERCENT] ]
```

As a convenience 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 INTO error_table] SEGMENT REJECT LIMIT count
[ROWS | PERCENT] ]
```

### errorTable

Tablename to log errors. **(String, default: ``)**

As error table is optional with SEGMENT REJECT LIMIT, it's only used if both segmentRejectLimit and segmentRejectType are set. Sets error\_table in below clause segment.

```
[ [LOG ERRORS INTO error_table] 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 through 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, `gpcdist` 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 window. This window is then released into a downstream when it gets full(`flushTime`) or timeout(`flushTime`) if window doesn't get full. One window is then ready to get sent 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 busy loop. Busy loop would be ok if there is a constant stream of data coming in but if incoming data is more like bursts then busy 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 enough 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 advised 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.

## 4.9 HDFS Sink

This module writes each message it receives to HDFS.

### 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 its runtime dependencies provided during startup if you would like to use a Hadoop distribution other than the default one.

## 4.10 HDFS Dataset Sink

This module writes each message it receives to HDFS as part of a Kite SDK Dataset.

### Options

The **hdfs-dataset** sink has the following options:

**hdfs.dataset.allow-null-values**

Whether null property values are allowed, if set to true then schema will use UNION for each field. **(Boolean, default: false)**

**hdfs.dataset.batch-size**

Threshold in number of messages when file will be automatically flushed and rolled over. **(Integer, default: 10000)**

**hdfs.dataset.compression-type**

Compression type name (snappy, deflate, bzip2 (avro only) or uncompressed) **(String, default: snappy)**

**hdfs.dataset.directory**

The base directory path where the files will be written in the Hadoop FileSystem. **(String, default: /tmp/hdfs-dataset-sink)**

**hdfs.dataset.format**

The format to use, valid options are avro and parquet. **(String, default: avro)**

**hdfs.dataset.fs-uri**

The URI to use to access the Hadoop FileSystem. **(String, default: <none>)**

**hdfs.dataset.idle-timeout**

Idle timeout in milliseconds when Hadoop file resource is automatically closed. **(Long, default: -1)**

**hdfs.dataset.namespace**

The sub-directory under the base directory where files will be written. **(String, default: <none>)**

**hdfs.dataset.partition-path**

The partition path strategy to use, a list of KiteSDK partition expressions separated by a '/' symbol. **(String, default: <none>)**

**hdfs.dataset.writer-cache-size**

The size of the cache to be used for partition writers (10 if omitted). **(Integer, default: -1)**

**Note**

This module can have its runtime dependencies provided during startup if you would like to use a Hadoop distribution other than the default one.

## 4.11 Jdbc Sink

A module that writes its incoming payload to an RDBMS using JDBC.

### Options

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

**jdbc.columns**

The names of the columns that shall receive data, as a set of column[:SpEL] mappings. Also used at initialization time to issue the DDL. **(java.util.Map<java.lang.String,java.lang.String>, default: <none>)**

**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)**

spring.datasource.data

Data (DML) script resource references. (**java.util.List<java.lang.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.initialize

Populate the database using 'data.sql'. (**Boolean**, **default: true**)

spring.datasource.password

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

spring.datasource.schema

Schema (DDL) script resource references. (**java.util.List<java.lang.String>**, **default: <none>**)

spring.datasource.url

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

spring.datasource.username

Login user 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.

## 4.12 Log Sink

The `log` sink uses the application logger to output the data for inspection.

### 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>**)

## 4.13 RabbitMQ Sink

This module sends messages to RabbitMQ.

### 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.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 to. **(String, default: <none>)**

spring.rabbitmq.host

RabbitMQ host. **(String, default: localhost)**

spring.rabbitmq.password

Login to authenticate against the broker. **(String, default: <none>)**

spring.rabbitmq.port

RabbitMQ port. **(Integer, default: 5672)**

spring.rabbitmq.requested-heartbeat

Requested heartbeat timeout, in seconds; zero for none. **(Integer, default: <none>)**

spring.rabbitmq.username

Login user to authenticate to the broker. **(String, default: <none>)**

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.

## 4.14 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.

### 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 against Message (**String, 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. (**java.lang.Class<?>, default: <none>**)

`spring.data.mongodb.grid-fs-database`

GridFS database name. (**String, default: <none>**)

`spring.data.mongodb.host`

Mongo server host. (**String, default: <none>**)

`spring.data.mongodb.password`

Login password of the mongo server. (**char[], default: <none>**)

`spring.data.mongodb.port`

Mongo server port. (**Integer, default: <none>**)

`spring.data.mongodb.uri`

Mongo database URI. When set, host and port are ignored. (**String, default: `mongodb://localhost/test`**)

`spring.data.mongodb.username`

Login user of the mongo server. (**String, default: <none>**)

Also see the [Spring Boot Documentation](#) for additional `MongoProperties` properties.

## 4.15 Pgcopyp Sink

A module that writes its incoming payload to an RDBMS using the PostgreSQL COPY command.

### 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. **(`java.util.List<java.lang.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 user 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.

## 4.16 Redis Sink

This module sends messages to Redis store.

### 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.password`

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

`spring.redis.pool.max-active`

Max 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.pool.max-idle`

Max number of "idle" connections in the pool. Use a negative value to indicate an unlimited number of idle connections. **(Integer, default: 8)**

`spring.redis.pool.max-wait`

Maximum amount of time (in milliseconds) a connection allocation should block before throwing an exception when the pool is exhausted. Use a negative value to block indefinitely. **(Integer, default: -1)**

spring.redis.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.port

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

spring.redis.sentinel.master

Name of Redis server. **(String, default: <none>)**

spring.redis.sentinel.nodes

Comma-separated list of host:port pairs. **(String, default: <none>)**

spring.redis.timeout

Connection timeout in milliseconds. **(Integer, default: 0)**

## 4.17 Router Sink

This application routes messages to named channels.

### 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. **(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](#).

## 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](#).

## 4.18 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.

## Options

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

`bucket`

AWS S3 bucket to store files (**String, no default**)

`bucketExpression`

SpEL Expression to evaluate S3 bucket against request `Message`` (**Expression, no default**)

`keyExpression`

SpEL Expression to evaluate S3 Object `key`` against request `Message`` (**Expression, default: `File.getName()` if any**)

`acl`

Access control list for S3 Object (**CannedAccessControlList, no default**)

`aclExpression`

SpEL Expression to evaluate access control list for S3 Object against request `Message`` (**Expression, no default**)

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`

## 4.19 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.

## Options

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

`sftp.auto-create-dir`

<documentation missing> **(Boolean, default: <none>)**

`sftp.factory.allow-unknown-keys`

True to allow an unknown or changed key. **(Boolean, default: false)**

`sftp.factory.cache-sessions`

<documentation missing> **(Boolean, default: <none>)**

`sftp.factory.host`

<documentation missing> **(String, default: <none>)**

`sftp.factory.known-hosts-expression`

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

`sftp.factory.pass-phrase`

Passphrase for user's private key. **(String, default: <empty string>)**

`sftp.factory.password`

<documentation missing> **(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. **(String, default: <empty string>)**

`sftp.factory.username`

<documentation missing> **(String, default: <none>)**



sftp.filename-expression

<documentation missing> (**Expression, default: <none>**)

sftp.mode

<documentation missing> (**FileExistsMode, default: <none>, possible values: APPEND,APPEND\_NO\_FLUSH,FAIL,IGNORE,REPLACE**)

sftp.remote-dir

<documentation missing> (**String, default: <none>**)

sftp.remote-file-separator

<documentation missing> (**String, default: <none>**)

sftp.tmp-file-suffix

<documentation missing> (**String, default: <none>**)

sftp.tmp-file-suffix

<documentation missing> (**String, default: <none>**)

sftp.use-temporary-filename

<documentation missing> (**Boolean, default: <none>**)

## 4.20 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'.

### 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

<documentation missing> (**Boolean, default: <none>**)

tcp.port

<documentation missing> (**Integer, default: <none>**)

tcp.reverse-lookup

<documentation missing> (**Boolean, default: <none>**)

tcp.socket-timeout  
 <documentation missing> (**Integer, default: <none>**)

tcp.use-direct-buffers  
 <documentation missing> (**Boolean, default: <none>**)

## 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)

## 4.21 Throughput Sink

A simple handler that will count messages and log witnessed throughput at a selected interval.

## 4.22 Websocket Sink

A simple Websocket Sink implementation.

### Options

The following command 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**)

**Example**

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=75eaf30-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.

---

## **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 building. See below for more information on how to 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 middleware 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 [m2eclipse](#) eclipse plugin for maven support. Other IDEs and tools should also work without issue.

### Importing into eclipse with m2eclipse

We recommend the [m2eclipse](#) 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.

## 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).