

## Building a SAM Application

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# Contents

<b>Building an Application.....</b>	<b>3</b>
Launch the Stream Builder UI.....	3
Add a New Stream Application.....	3
Add a Source.....	6
Connect Components.....	10
Join Multiple Streams.....	10
Filter Events in a Stream.....	11
Use Aggregate Functions over Windows.....	16
Deploying a Stream App.....	18
Configure Deployment Settings.....	18
Deploy the App.....	19

## Building an Application

### Prerequisites

- You have integrated SAM
- You have set up appropriate environments and service pools

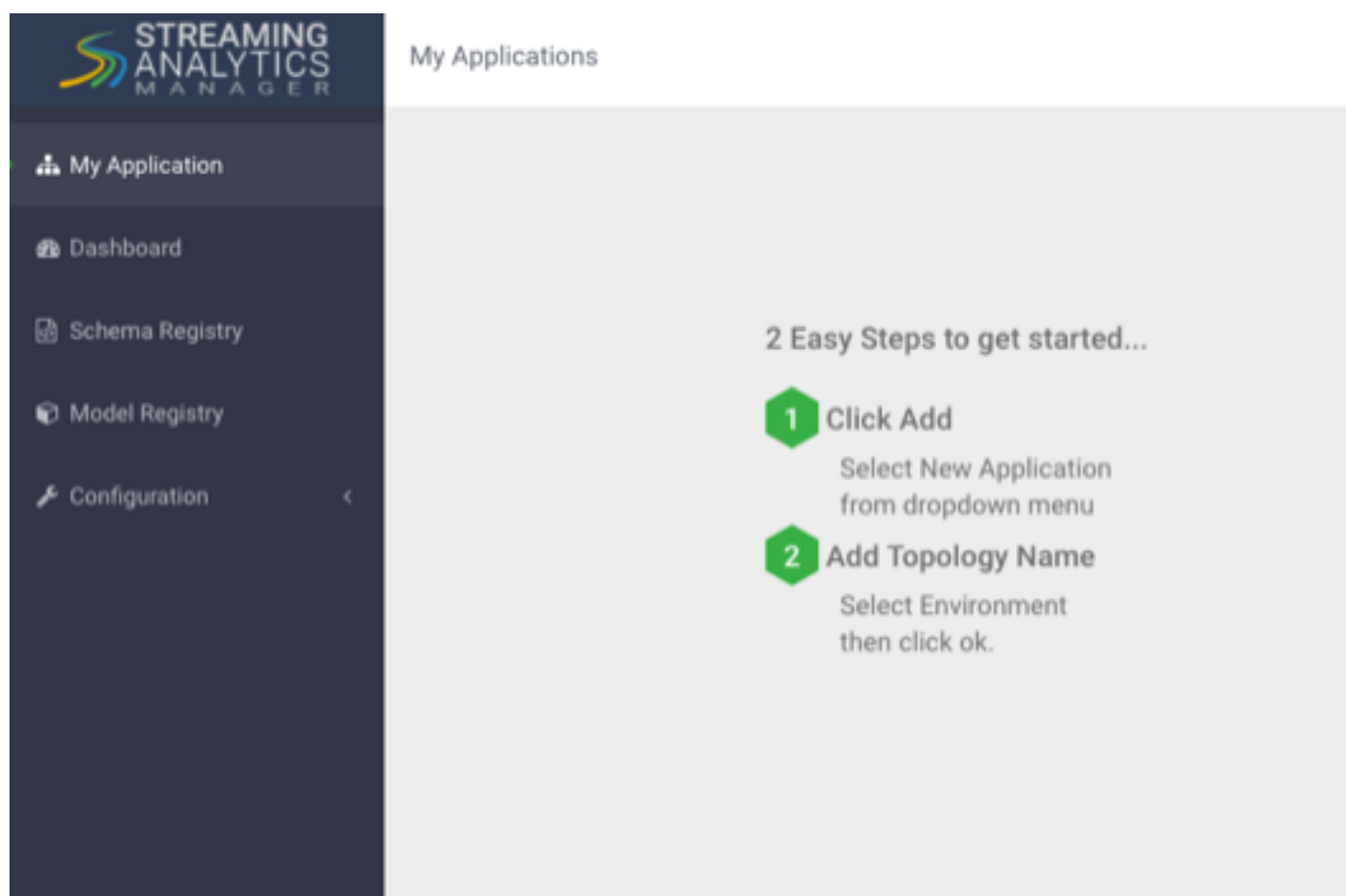
## Launch the Stream Builder UI

### Procedure

1. In Ambari, select **Streaming Analytics Manager** from the left-hand **Services** pane.
2. Under **Quick Links**, select **SAM UI**.

### Results

The SAM Stream Builder UI displays. You can return at any time by clicking **My Applications** from the left-hand menu.



## Add a New Stream Application

### Procedure

1. Specify the name of the stream application and the environment you want to use.

**Note:**

The name of the stream app should not have any spaces.

The screenshot shows a dialog box titled "Add Stream" with a close button (X) in the top right corner. Below the title bar, there are two input fields. The first is labeled "NAME" and contains the text "Trucking-IOT-Stream-Analytics". The second is labeled "ENVIRONMENT" and has a dropdown menu with "Dev" selected. At the bottom right of the dialog, there are two buttons: "Cancel" and "Ok".

2. SAM displays the Stream Builder canvas. Builder components on the canvas palette are the building blocks you use to build stream apps. Refer to the *HDF Overview* for information about each component building block.

The screenshot displays the Hortonworks Streaming Analytics Manager interface. At the top, the text "My Applications" is followed by a tab labeled "Sample Application", which is highlighted with a blue border. To the right of the tab, there is a blue arrow pointing left towards the text "Edit and n" and "ap". Below the tab, a search icon and a pencil icon are visible. A vertical palette on the left side is highlighted with a blue border and contains the following categories and components:

- SOURCE**
  - Event Hubs icon
- EVENT HUBS**
- HDFS**
- KAFKA**
- PROCESSOR**
  - Aggregate icon ( $\Sigma$ )
  - Branch icon
  - Join icon
  - PMML icon
  - Projection Bolt icon
  - Rule icon
- ENRICH**

A blue arrow points from the text "Processor, source, and sink palette contains builder components" to the vertical palette.

## Add a Source

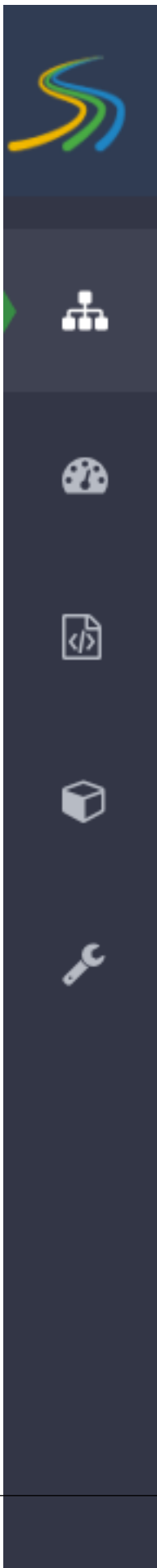
As described in the *HDF Overview*, Stream Builder offers four types of builder components: sources, processors, sinks, and custom components. Start building your application by adding a source.

### Before you begin

You have configured Schema Registry and integrated with SAM.

### Procedure

1. Drag a source builder component, Kafka for example, onto the canvas. This creates a Kafka tile component:



# My Applications / IOT-Trucking-Ref-App

SEARCH ✎

**SOURCE**

 **KAFKA**

**EVENT HUBS**

 **HDFS**

 **KAFKA**

**PROCESSOR**

 **AGGREGATE**

 **BRANCH**

 **JOIN**

Kafka source tile



Click the arrows to increase or decrease the number of builder component instances for performance and scalability needs

2. Double-click the tile to begin configuring Kafka. After you specify a Kafka topic name, SAM communicates with Schema Registry and displays the schema:



# TruckGeoEvent

Kafka connection settings are populated by SAM based on the Kafka service in Environment the Service Pool

REQUIRED    OPTIONAL    NOTES

CLUSTER NAME \*

streamanalytics

SECURITY PROTOCOL \*

PLAINTEXT

BOOTSTRAP SERVERS \*

secure-fenton-hdf5.field.hortonworks.com:6667,secure

KAFKA TOPIC \*

truck\_events\_avro

CONSUMER GROUP ID \*

truck\_geo\_event\_1|

After you select a Kafka topic, SAM fetches the topic schema from Schema Registry

3. Add the additional components you want to use to develop your stream app.

### Results

When you have added and correctly configured your stream app components, the component tile displays a green dot on the left. You cannot connect a source to different processors or sinks until it is correctly configured.

## Connect Components

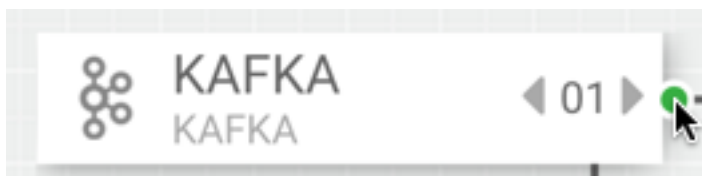
Once you have added and configured your source, add additional processors and sinks to the canvas. To pass a stream of events from one component to the next, create a connection between the two components. In addition to defining data flow, connections allow you to pass a schema from one component to another.

### Before you begin

You have added and configured at least one source.

### Procedure

1. Click the green dot to the left of your source component.



2. Drag your cursor to the component tile to which you want to connect.

## Join Multiple Streams

Joining multiple streams is an important SAM capability. You accomplish this by adding the Join processor to your stream application.

### Procedure

1. Drag a Join processor onto your canvas and connect it to a source.
2. Double click the Join tile to open the **Configuration** dialog.
3. Configure the Join processors according to your streaming application requirements.

**Example**

**JOIN**

Join stream\_1 on field driverId

**CONFIGURATION** NOTES

**Input**

kafka\_stream\_1

eventTime\*  
STRING

eventSource\*  
STRING

truckId\*  
INTEGER

driverId\*  
INTEGER

driverName\*  
STRING

routeId\*  
INTEGER

route\*  
STRING

eventType\*  
STRING

latitude\*  
DOUBLE

longitude\*  
DOUBLE

correlationId\*  
LONG

kafka\_stream\_1

driverId

JOIN TYPE

INNER

SELECT STREAM

kafka\_stream\_2

WINDOW INTERVAL TYPE\*

Time

WINDOW INTERVAL\*

05

Seconds

OUTPUT FIELDS\*

× eventTime × eventSource × truckId × driverId

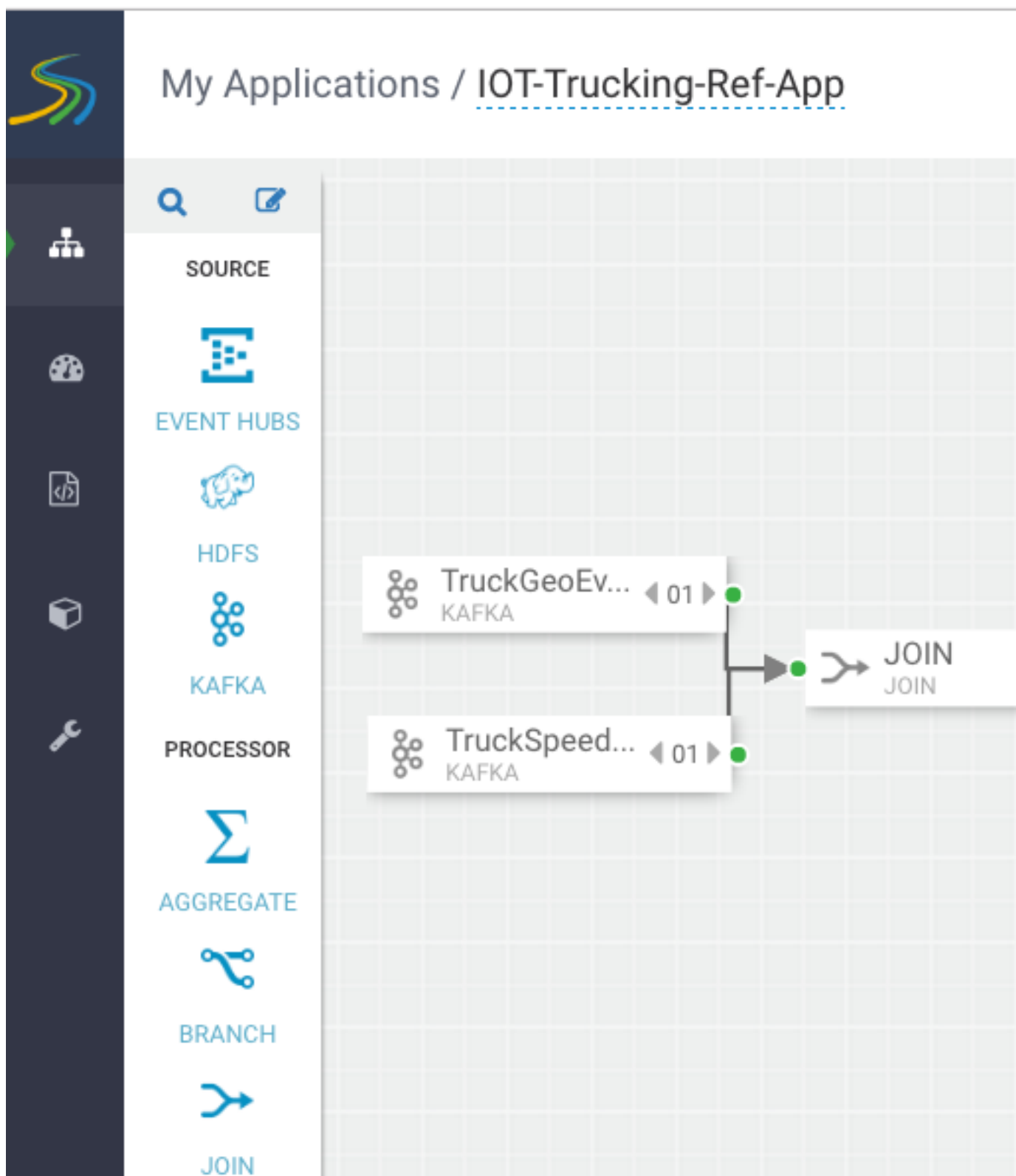
× latitude × longitude × correlationId × geo

**Filter Events in a Stream**

You can use SAM to filter events in the stream. You accomplish this by using Rule processor, which translates rules into SQL queries that operate on the stream of data.

**Procedure**

1. Drag the Rule processor to the canvas and connect it to the Join processors.



2. Double click the Rule processor, click the + **Add New Rules** button, and create a new rule:

## Add New Rule

RULE NAME\*

Violation Event

DESCRIPTION\*

Events that are infractions from drivers and trucks

CREATE QUERY\*

eventType



NO

QUERY PREVIEW:

```
eventType <> 'Normal'
```

3. Click **Ok** to save the new rule.

Example

# EventType

**CONFIGURATION** NOTES

## Input

- eventTime\*  
STRING
- eventSource\*  
STRING
- truckId\*  
INTEGER
- driverId\*  
INTEGER
- driverName\*  
STRING
- routeId\*  
INTEGER
- route\*  
STRING
- eventType\*  
STRING
- latitude\*  
DOUBLE
- longitude\*  
DOUBLE
- correlationId\*  
LONG

**+Add New Rules**

Name	Condition
Violation Event	eventType

A rule that i  
that looks  
stream wi  
equal to Nor  
a V

## Use Aggregate Functions over Windows

Windowing is the ability to split an unbounded stream of data into finite sets based on specified criteria such as time or count, so that you can perform aggregate functions (such as sum or average) on the bounded set of events. In SAM, you accomplish this using the Aggregate processor. The Aggregate processor supports two window types, tumbling and sliding windows. You can create a window based on time or count.

### Procedure

1. Drag the Aggregate processor to the canvas and connect it to the stream application you are building.
2. Double click the Aggregate tile to configure it according the your stream application requirements.



Example

# DriverAvgSpeed

**CONFIGURATION** NOTES

**The fields to group by**

**Input**

- truckId\*  
INTEGER
- driverId\*  
INTEGER
- driverName\*  
STRING
- routeId\*  
INTEGER
- route\*  
STRING
- eventType\*  
STRING
- latitude\*  
DOUBLE
- longitude\*  
DOUBLE
- correlationId\*  
LONG
- geoAddress\*  
STRING
- speed\*  
INTEGER

**SELECT KEYS\***

× driverId × driverName × route

**WINDOW INTERVAL TYPE\***

Time

**WINDOW INTERVAL\***

3

**SLIDING INTERVAL**

3

**TIMESTAMP FIELD**

processingTime ×

**Output Fields**

## Deploying a Stream App

### Configure Deployment Settings

Before deploying the application, it is important to configure deployment settings such as JVM size, number of ackers, and number of workers.

Because this topology uses a number of joins and windows, you should increase the JVM heap size for the workers. Click the gear icon on the top right corner of the canvas, and increase the number of workers (e.g.: 5) and increase the JVM heap memory (-Xmx3072m).

**Topology Configuration**

NUMBER OF WORKERS

5

NUMBER OF ACKERS

1

TOPOLOGY MESSAGE TIMEOUT (SECONDS)

40

WORKER JVM OPTIONS

-Xmx3072m

**HBase config**

HBASE ROOT DIRECTORY \*

hdfs://localhost:9000/tmp/hbase

Cancel

### Deploy the App

After the app's deployment settings has been configured, click the Deploy button on the lower right of the canvas. During the deployment process, Streaming Analytics Manager completes the following tasks:

#### Procedure

1. Construct the configurations for the different big data services used in the stream app.

2. Create a deployable jar of the streaming app.
3. Upload and deploy the app jar to streaming engine server.

### Results

The stream app is deployed to a Storm cluster based on the Storm Service defined in the Environment associated with the app.

The screenshot displays the Hortonworks Streaming Analytics Manager interface. At the top, the title is "My Applications / IOT-Trucking-Ref-App". On the left, a vertical sidebar contains navigation icons and a search bar. Below the search bar is a menu with categories: SOURCE, EVENT HUBS, HDFS, KAFKA, PROCESSOR, AGGREGATE, BRANCH, JOIN, PMML, PROJECTION, RULE, and SINK. The main workspace shows a data pipeline on a grid background. It consists of three nodes: "TruckGeoEv... KAFKA" (with a left arrow and "01"), "TruckSpeed... KAFKA" (with a left arrow and "01"), and "JOIN JOIN" (with a left arrow and "01"). Arrows connect the two source nodes to the join node.

After the application has been deployed successfully, Streaming Analytics Manager notifies you and updates the status to Active, as shown in the following diagram.

The screenshot displays the Hortonworks Streaming Analytics Manager interface for an application named "IOT-Trucking-Ref-App". On the left is a vertical navigation sidebar with icons for various components: SOURCE, EVENT HUBS, HDFS, KAFKA, PROCESSOR, AGGREGATE, BRANCH, JOIN, PMML, PROJECTION, and RULE. The main workspace shows a data flow diagram on a grid background. It consists of three nodes: "TruckGeoEv... KAFKA" (with a left arrow and "01"), "TruckSpeed... KAFKA" (with a left arrow and "01"), and "JOIN JOIN" (with a left arrow and "01"). Arrows from the two source nodes converge into the join node. A search icon and a pencil icon are visible at the top of the workspace area.