

StreamSets Microservice Pipeline Example

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Introduction

StreamSets Data Collector allows pipelines to be deployed as microservices. Not surprisingly, these are referred to as [Microservice Pipelines](#). This document describes an example microservice pipeline that returns `true` or `false` if a number posted to it is a prime number or not. We'll deploy the `is_prime` microservice as a Data Collector Job, and then call the microservice from `curl` as well as from a traditional Data Collector pipeline, where the microservice response will be used to enrich records flowing through the pipeline. And then finally, we'll demonstrate how a pipeline can call the microservice in a loop until a prime number is found and then exit.

Prerequisites

- The microservice pipeline deployed in this example is configured to use Data Collector as an API Gateway with [Gateway Authentication](#) so the caller must have StreamSets Platform [API Credentials](#).
- The microservice in this example will be exposed on Data Collector's default port, typically port 18630. Firewall rules must allow clients of the microservice access to the Data Collector host on this port. Production microservices are typically fronted by a load balancer with multiple back-end Data Collector instances providing HA and failover for the microservice.

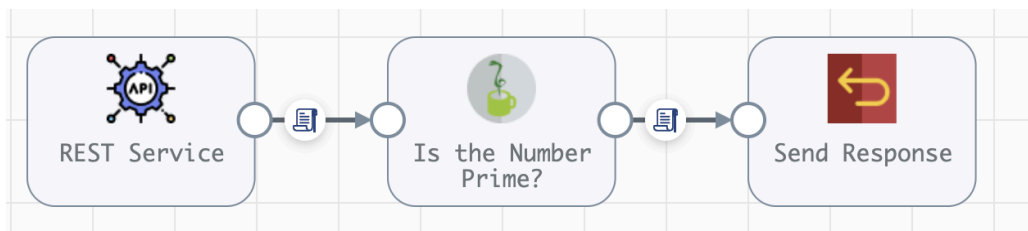
Import the Pipelines

- Download the pipeline archive as a zip file from [here](#) (click the page's download link)
- Import the pipeline as a pipeline archive (docs on how to do that are [here](#)).

You should see the following three pipelines have been added to your pipeline list.

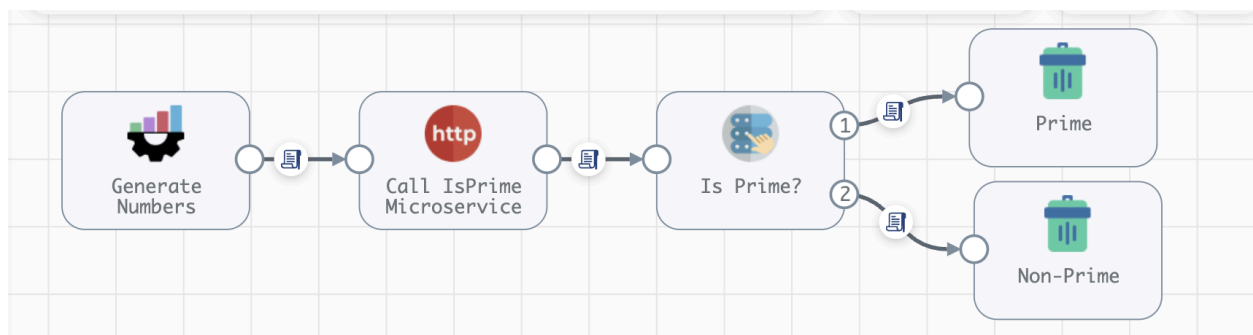
IsPrimeMicroservice

Here is the `IsPrimeMicroservice` Data Collector pipeline:



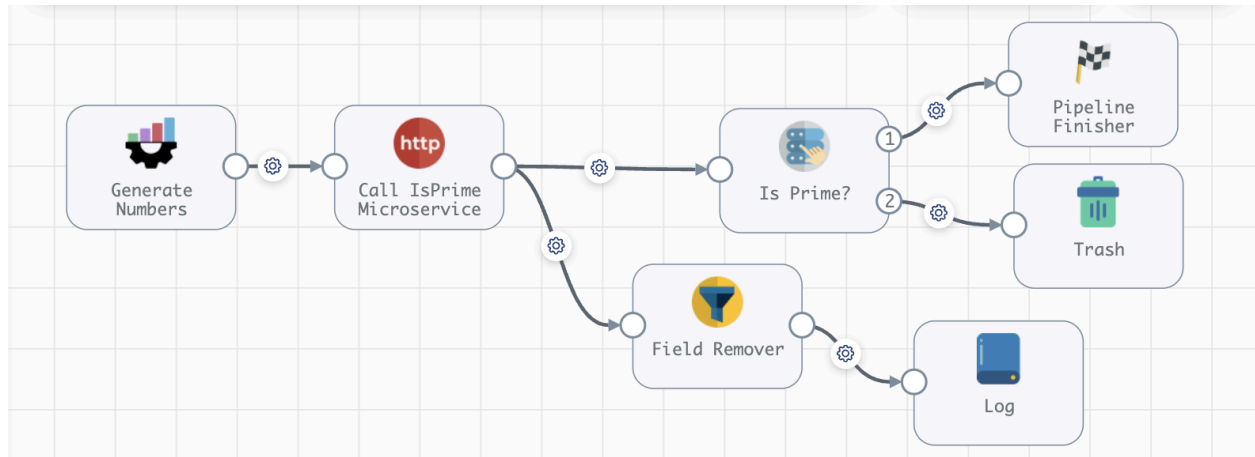
IsPrimeMicroserviceConsumer

Here is the `IsPrimeMicroserviceConsumer` Data Collector pipeline that calls the `IsPrimeMicroservice` to enrich records (before discarding them):



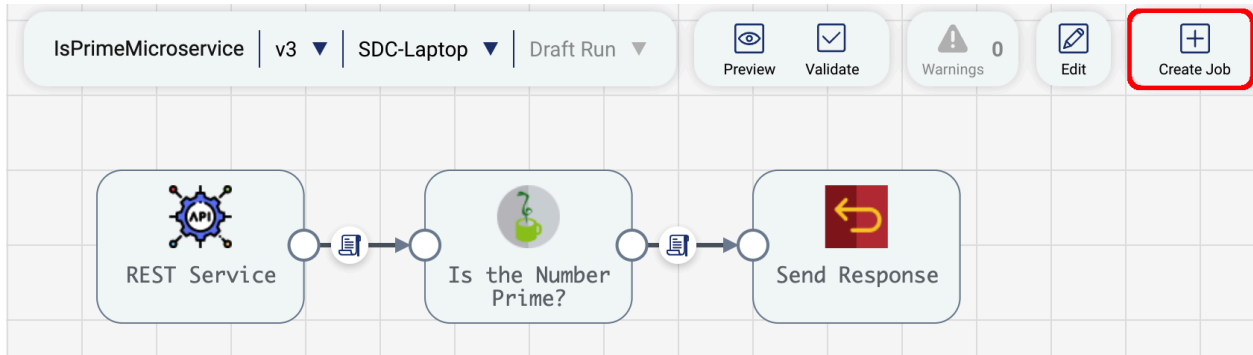
Loop until we get a prime number

Here is the `Loop until we get a prime number` Data Collector pipeline that calls the `IsPrimeMicroservice` with a series of random numbers in a loop until we get a prime number, at which point the pipeline exits:



Create a Job for the IsPrimeMicroservice pipeline

Open the `IsPrimeMicroservice` pipeline and click its `Create Job` button:



Set the Job's name. I personally like to remove the "Job for " prefix so my Job's name matches my pipeline's name, like this:

Create Job Instances

1

Define Job

Define job details. [Learn more](#)

Name:

IsPrimeMicroservice

Description:

Job Tags:

Add New...

Cancel

Next

Click Next

The current version of the pipeline will be selected for the Job:

Create Job Instances

1

 Define Job

2

 Select Pipeline

Click **Next**

Set your Data Collector Engine Label:

3

 Configure Job

Configure job details to determine how engines run the pipeline. The default values for the advanced options should work in most cases. [Learn more](#)

Deployment: SDC-AWS (Self-Managed)

Engine Labels:

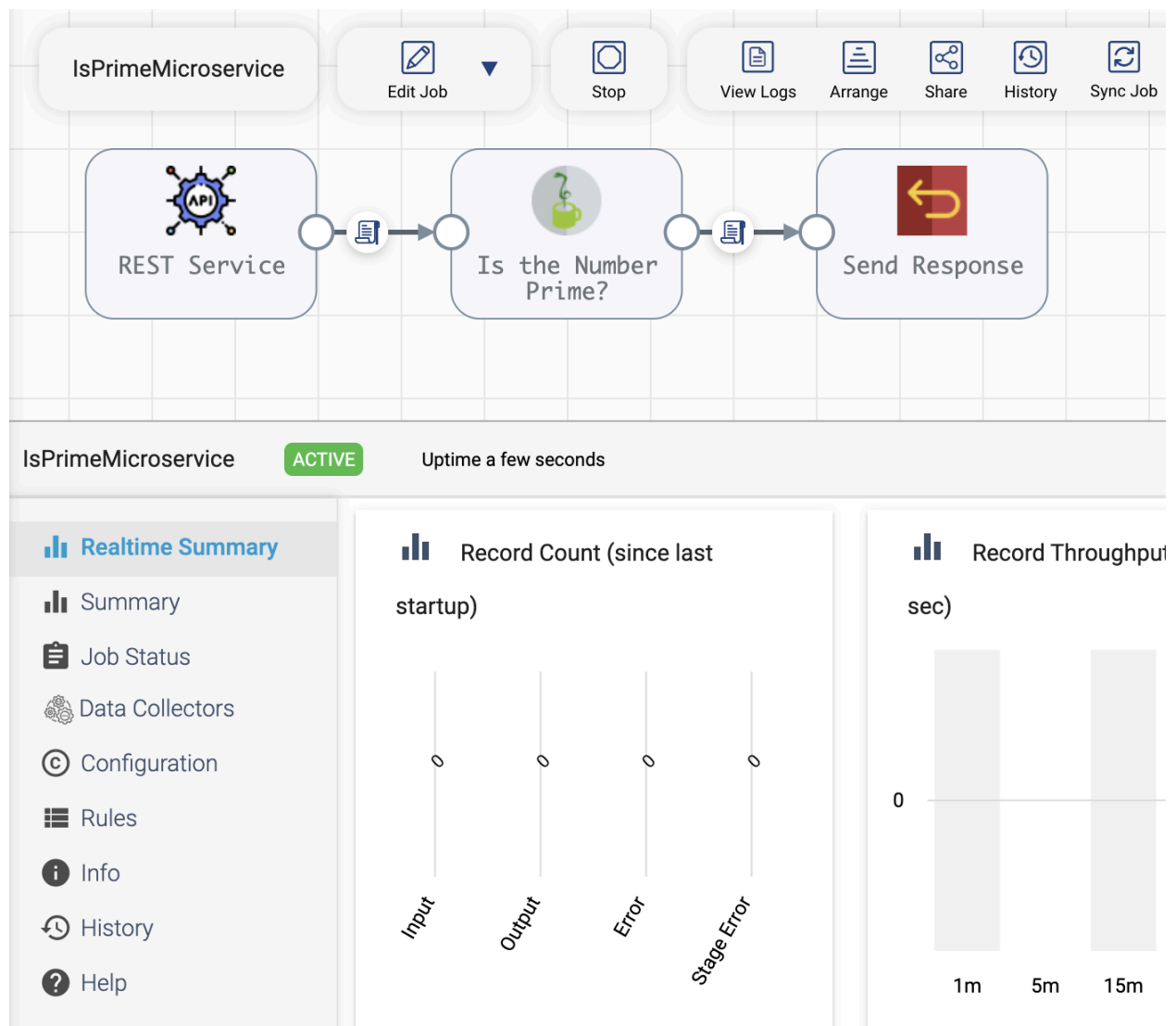
SDC-AWS Add New...

Enable Failover: ☒

Click **Save & Next**

Then click **Start & Monitor Job**

You should see the monitoring view for the `IsPrimeMicroservice` that has not yet received any requests:



Call the microservice using curl

The URL for the microservice is:

http://<Data Collector Host>:18630/rest/v1/gateway/is_prime

In a terminal session, set and export your CRED_ID and CRED_TOKEN from your API Credentials:

```
$ export CRED_ID=50f6eca6-eaca...
```

```
$ export CRED_TOKEN=eyJ0eXAiOi...
```

Then call the microservice using `curl` like this, passing in a composite number like 100. Use the Data Collector's hostname in the URL:

```
$ curl http://<Data Collector Host>:18630/rest/v1/gateway/is_prime \
-H "Content-Type:application/json" \
-H "X-Requested-By:curl" \
-H "X-SS-App-Component-Id: $CRED_ID" \
-H "X-SS-App-Auth-Token: $CRED_TOKEN" \
-d '{"number": 100}'
```

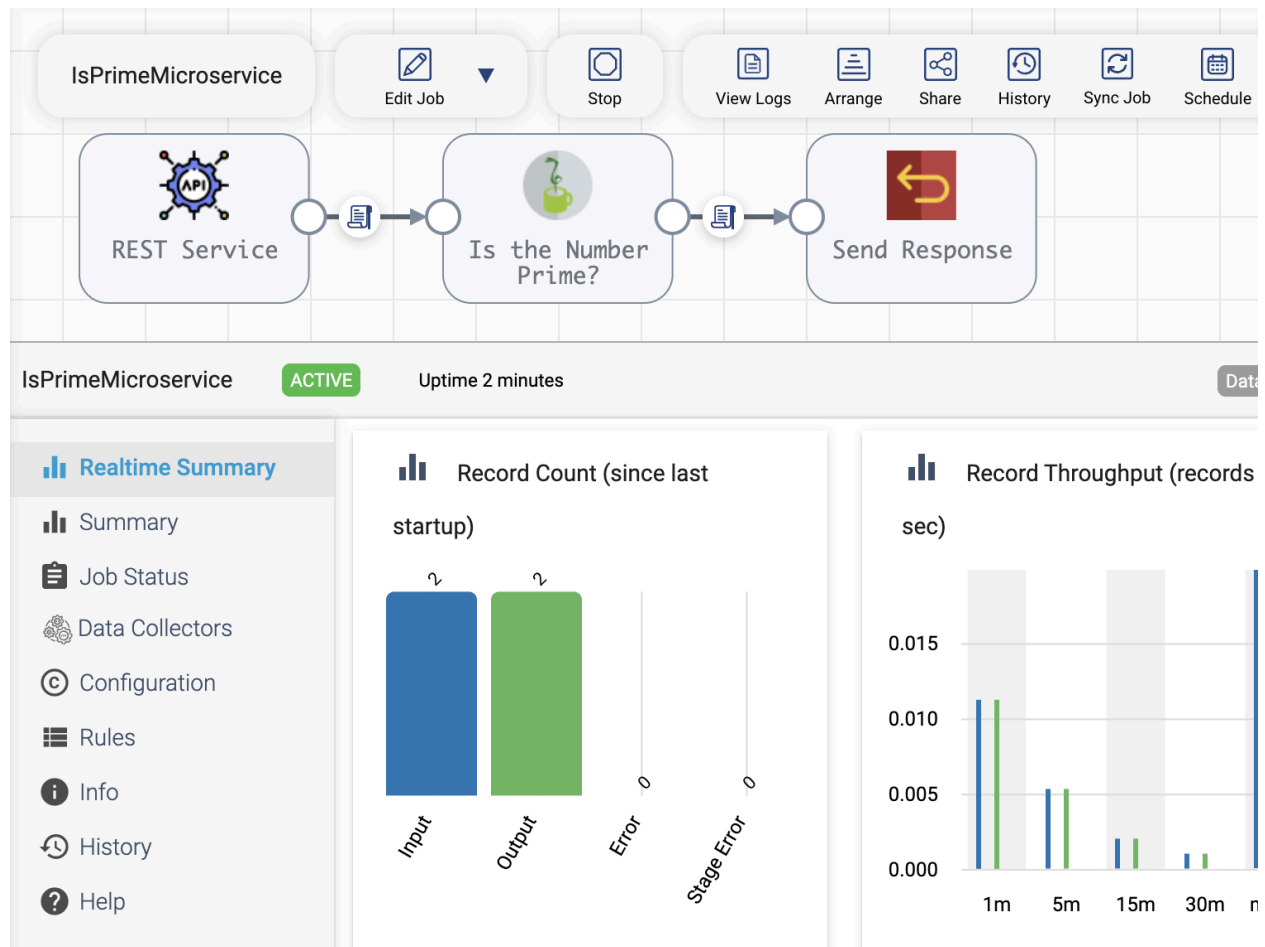
You should receive a response that 100 is not prime:

```
mark@SAG-FV43FHGCVG ~ % curl http://portland.onefoursix.com:18630/rest/v1/gateway/is_prime \
-H "Content-Type:application/json" \
-H "X-Requested-By:curl" \
-H "X-SS-App-Component-Id: $CRED_ID" \
-H "X-SS-App-Auth-Token: $CRED_TOKEN" \
-d '{"number": 100}'
{"statusCode":200,"data":[{"number":100,"is_prime":"false"}],"error":[]}
```

Repeat the command with a prime number:

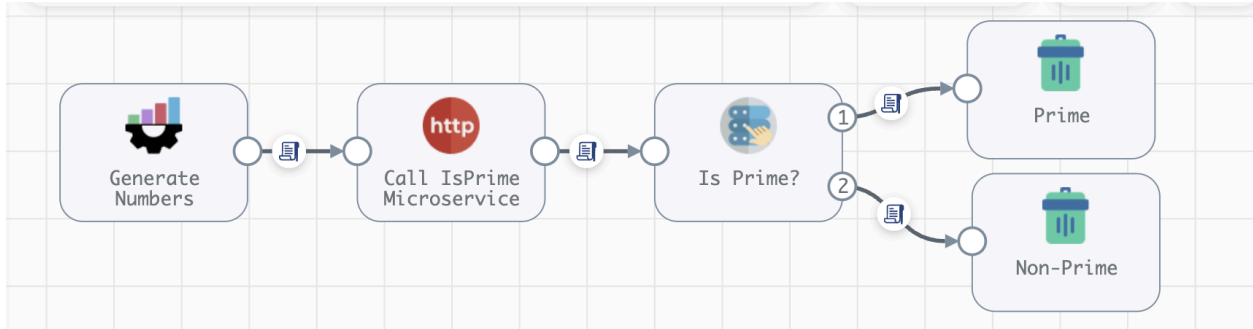
```
mark@SAG-FV43FHGCVG ~ % curl http://portland.onefoursix.com:18630/rest/v1/gateway/is_prime \
-H "Content-Type:application/json" \
-H "X-Requested-By:curl" \
-H "X-SS-App-Component-Id: $CRED_ID" \
-H "X-SS-App-Auth-Token: $CRED_TOKEN" \
-d '{"number": 97}'
{"statusCode":200,"data":[{"number":97,"is_prime":"true"}],"error":[]}
```


You should also see the microservice has handled two requests:



Call the microservice from a Data Collector Pipeline

Open the `IsPrimeMicroserviceConsumer` pipeline in the pipeline editor.



Edit the pipeline's parameters and set the parameter `IS_PRIME_MICROSERVICE_URL` to the URL of the the microservice:

The screenshot shows the 'Parameters' tab of the pipeline editor. It features a 'Hide Advanced Options' link and a 'Parameters' section. A parameter named `IS_PRIME_MICROSERVICE_URL` is shown with its value `http://portland.onefoursix.com:18630/rest/v1/gateway/is_prime`. Below the parameter list are links for '+ ADD ANOTHER' and 'BULK EDIT MODE'.

In my environment the value is:

```
http://portland.onefoursix.com:18630/rest/v1/gateway/is_prime
```

This pipeline uses a Dev Data Generator to generate records with an integer field named "number":

General

Data Generator

Header Attributes ⓘ

+ ADD

≡ BULK EDIT MODE

Fields to Generate ⓘ

1

Field Name

number

Field Type

INTEGER

Field Attributes ⓘ

+ ADD

An HTTP Client Processor is used to call the microservice. Here is the top half of the config pane:

The screenshot displays the configuration pane for an HTTP Client Processor, with the 'HTTP' tab selected. The pane is divided into several sections, with two sections highlighted by red rectangles. The first highlighted section contains the 'Resource URL' and 'Output Field' fields. The 'Resource URL' field is set to `${IS_PRIME_MICROSERVICE_URL}` and the 'Output Field' is set to `/response`. The second highlighted section contains the 'Headers' field, which is set to `X-Requested-By` with a value of `sdc`. Other visible fields include 'Missing Values Behavior' set to 'Pass the record along the pipeline unchanged' and 'Multiple Values Behavior' set to 'First value only'.

Field	Value
Resource URL	<code>\${IS_PRIME_MICROSERVICE_URL}</code>
Output Field	<code>/response</code>
Missing Values Behavior	Pass the record along the pipeline unchanged
Multiple Values Behavior	First value only
Headers	<code>X-Requested-By</code> : <code>sdc</code>

And here is the lower half of the config pane:

Additional Security Headers ⓘ

Name	Value
X-SS-App-Component-Id SHOW VALUE
X-SS-App-Auth-Token SHOW VALUE

[+ ADD ANOTHER](#) [≡ BULK EDIT MODE](#)

HTTP Method ⓘ POST ▾ [<>](#)

Request Data ⓘ

1	{"number": \${record:value('/number')}}}
---	--

Note that the JSON payload posted to the microservice is constructed like this:

```
{"number": ${record:value('/number')}}}
```

A [Stream Selector](#) is used to route records that are prime to the top path and non-prime records to the bottom path. Here is the routing condition in the Stream Selector:

Condition ⓘ

- ⋮ 1 `${record:value('/response/data[0]/is_prime')} == 'true'}`
- 2 default

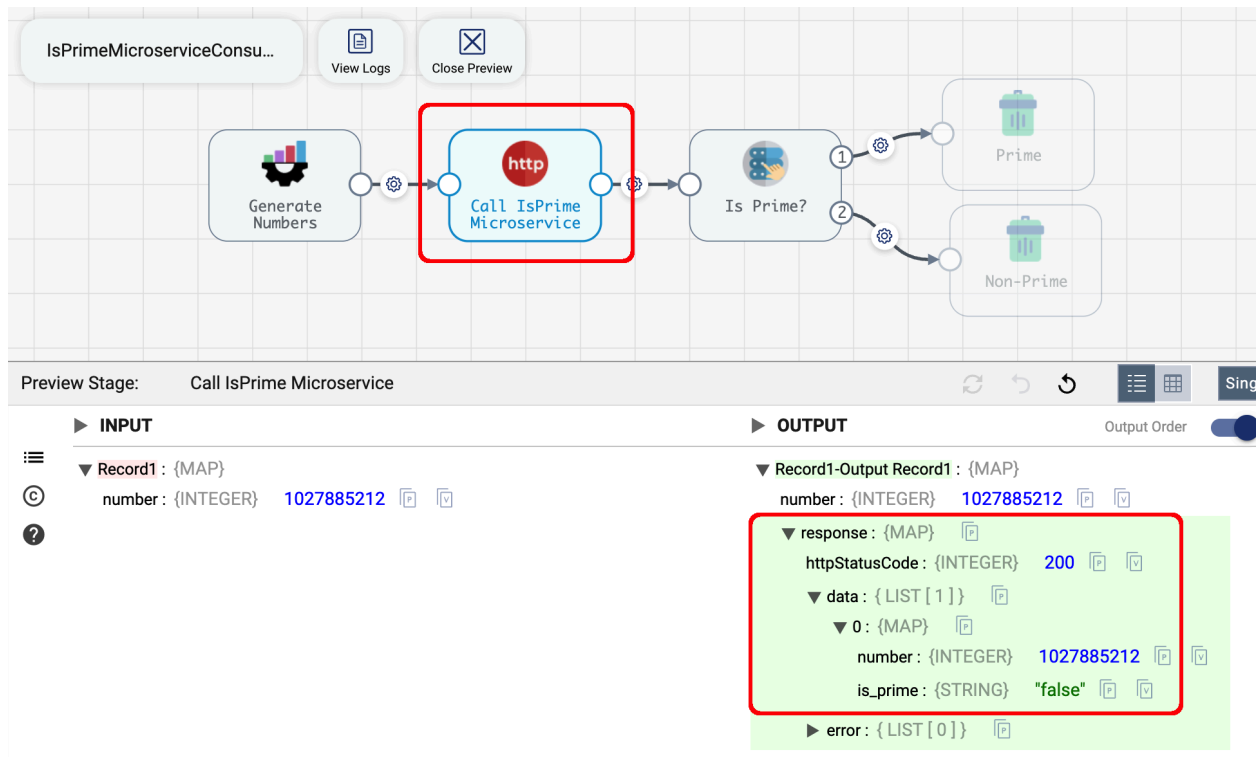
The expression is:

```
${record:value('/response/data[0]/is_prime')} == 'true'}
```

A good way to see where and how to unpack the response is to use Preview mode as shown in the next section.

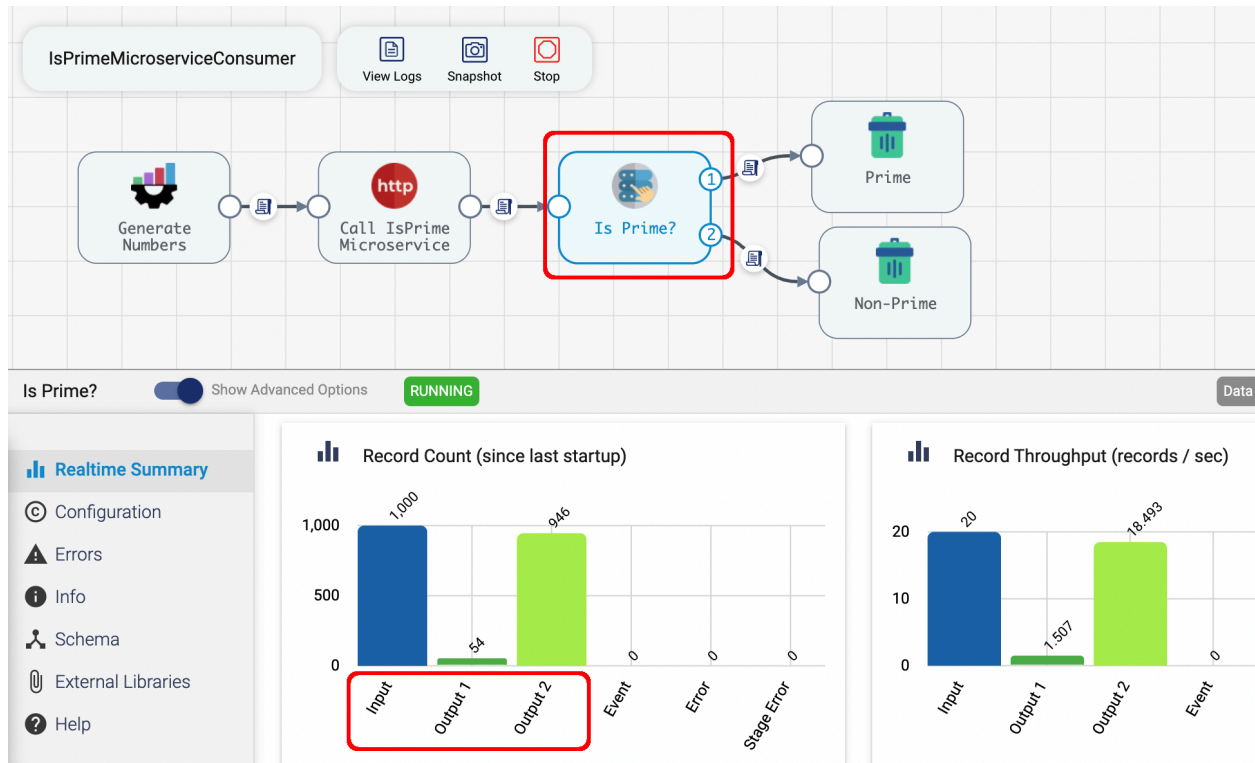
Preview the IsPrimeMicroserviceConsumer pipeline

Preview the `IsPrimeMicroserviceConsumer` pipeline to see the numbers generated and the response from the microservice:



Run the IsPrimeMicroserviceConsumer pipeline

Run the `IsPrimeMicroserviceConsumer` pipeline to see the proportion of prime vs non-prime numbers. Click on the Stream Selector to see the distribution. In my tests, after 1000 numbers were generated, I saw 54 were primes and 946 were not:



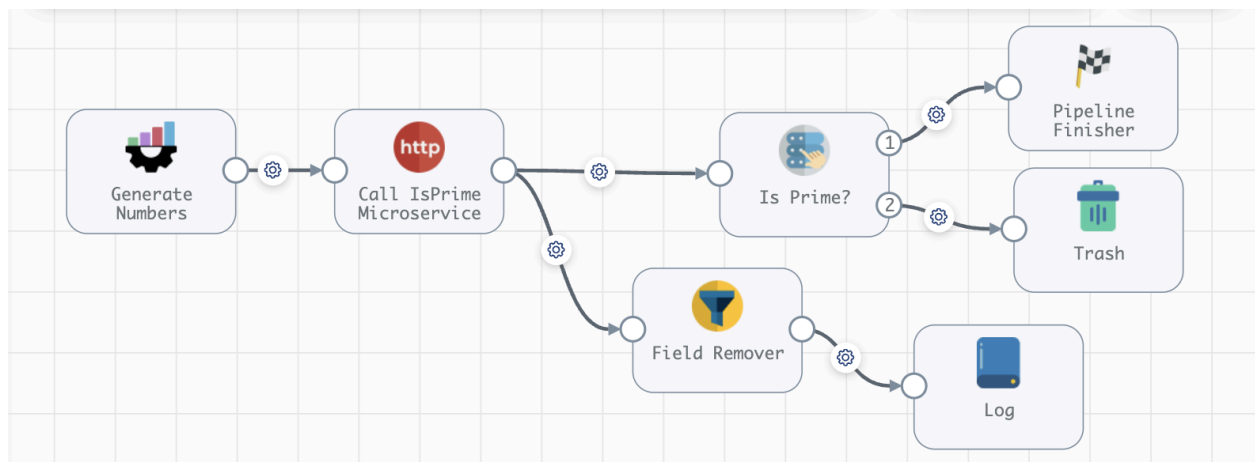
Calling a Microservice in a loop until a desired response is returned

We can use the same `IsPrimeMicroservice` to demonstrate how to call a service in a loop until a desired state is reached.

In this case, we'll generate a random integer and test if it is a prime number. If not, we'll ignore that value and generate a new random integer. We'll stay in this loop until we get a prime number, in which case we will exit the loop.

We'll write all the numbers to a file, and expect the last number written to be prime.

Here is the `Loop until we get a prime number` pipeline:



Set these parameters for the microservice URL and the output dir on the local file system for the numbers log:

General	Parameters	Notifications	Error Records	Advanced	Test Origin
Hide Advanced Options ^					
Parameters					
IS_PRIME_MICROSERVICE_URL		:	http://portland.onefoursix.com:18630/rest/v1/gateway/is_prime		
OUTPUT_DIR		:	/Users/mark/data/out		

A key aspect of the Generate Numbers data generator is it is configured to send only one record per batch, in order to process each record individually (set this on the General tab for the stage):

Batch Size i

The call to the microservice is the same as in the previous pipeline.

The Field Remover keeps only the number field:

General	Remove/Keep
Action	Keep Listed Fields
Fields	<div>/number × Add New...</div>

The `Is Prime?` Stream Selector has the same conditions as the previous pipeline, but in this case if the first leg is true (i.e. if the number is prime), it routes the record to a pipeline finisher and the pipeline exits. If the number is not prime the event goes to the trash (i.e. it is ignored) but the pipeline is not stopped, so the origin generates the next number.

A test run shows it took 15 tries before I hit a prime number (see the next page)



Here is the file written by the pipeline:

```
{"number":-596013418}
{"number":981744798}
{"number":774886028}
{"number":1845276890}
{"number":-855017289}
{"number":-271813162}
{"number":-936348597}
{"number":-941727796}
{"number":381160663}
{"number":564360002}
{"number":-1167057438}
{"number":1076428630}
{"number":-1392352967}
{"number":1920748387}
{"number":540607961}
```

I'll curl the microservice to confirm the last number is indeed prime:

```
mark@SAG-FV43FHGCVG ~ % curl http://portland.onefoursix.com:18630/rest/v1/gateway/is_prime \
-H "Content-Type:application/json" \
-H "X-Requested-By:curl" \
-H "X-SS-App-Component-Id: $CRED_ID" \
-H "X-SS-App-Auth-Token: $CRED_TOKEN" \
-d '{"number": 540607961}'
{"statusCode":200,"data":[{"number":540607961,"is_prime":"true"}],"error":[]}
```