

# Discounts Processor (Kafka Streams version)

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[HTML version](#)

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# 1. Overview

This project (Discounts Processor (Kafka Streams version)) is a Java/ [Kafka Streams](#) application that processes event data from [Redpanda](#) and generates [discount events](#) based on some [conditions](#). So, based on the [input events](#), it analyzes if the user is able to get discounts.

## ! PROJECT STATUS: UNDER DEVELOPMENT "

Status:

1. [Continuous View Discount Processor](#): Working well.
2. [Most Viewed Product Discount Processor](#): Under development/ test.

This module can be treated almost<sup>[1]</sup> entirely independently of [the main project](#) that encompasses it. It is an alternative intended to produce the same result as the [connect.yaml](#) file configured using [Redpanda Connect](#). In other words, it is a discount processor that works under the same [rules](#).

The tests in this module are [unit tests](#) and [integration tests](#). Some of them are written in [Kotlin](#) following the [BehaviourSpec](#) provided by [Kotest](#) framework.

The [integration tests](#) developed are executed with the help of [TestContainers](#).

## 2. Discount Conditions

### 2.1. Continuous View Discount

A single discount of 10% (within a 5-minute window) is generated when:

- ¥ A user views the same product continuously within a 90-second window.

### 2.2. Most Viewed Product Discount

#### 2.2.1. Basic Rules

For each user, a 10% discount is generated for their most viewed product within a fixed 5-minute window.

#### 2.2.2. Detailed Specifications

##### Time Window

- ¥ Fixed 5-minute windows (00:00-00:05, 00:05-00:10, etc.)
- ¥ Discount evaluation occurs at the end of each window
- ¥ Events are processed based on their `collector_timestamp`

##### Event Flow

1. A `product_view` event initiates a viewing session
2. Subsequent `page_ping` events for that product are counted
3. Session continues until another `product_view` event occurs
4. Process repeats for the new product

##### View Counting

- ¥ Minimum threshold: 3 views within the window
- ¥ Only `page_ping` events count towards view totals
- ¥ View duration is calculated using `page_ping` timestamps

##### Discount Generation

- ¥ Scope: Per user
- ¥ Generated at window end
- ¥ One discount per user per window
- ¥ Cooldown: 5-minute period per user after receiving any discount

## Tiebreaker Rules

If a user has multiple products with the same number of views: 1. Product with longest total viewing time wins 2. If still tied, first product viewed wins

*Table 1. Example Timeline (for user "U1")*

Time	Event	Effect
10:00:00	Window starts	
10:00:10	product_view P1	Start tracking P1
10:00:15-00:45	4 page_ping P1	P1: 4 views
10:01:00	product_view P2	Start tracking P2
10:01:05-01:50	6 page_ping P2	P2: 6 views
10:02:00	product_view P1	Start tracking P1 again
10:02:05-02:30	3 page_ping P1	P1: total 7 views
10:05:00	Window ends	P1 wins (7 views)

## 3. Event examples

### 3.1. Input (in snowplow-enriched-good topic)

product\_view event:

```
{
  "collector_timestamp": "2025-04-04T07:05:00.119Z",
  "event_name": "product_view",
  "user_id": "1",
  "product_id": "5",
  "product_name": "SP Flex Runner 2",
  "product_price": 42.99,
  "webpage_id": "page_5"
}
```

page\_ping event:

```
{
  "collector_timestamp": "2025-04-04T07:05:12.130Z",
  "event_name": "page_ping",
  "user_id": "1",
  "webpage_id": "page_5"
}
```

### 3.2. Output (in shopper-discounts topic)

discount event examples:

Continuous View Discount:

```
{
  "user_id": "1",
  "product_id": "5",
  "discount": {
    "rate": 0.1,
    "by_view_time": {
      "duration_in_seconds": 100
    }
  }
}
```

Most Viewed Product Discount:

```
{
```

```
Ê "user_id": "1",  
Ê "product_id": "5",  
Ê "discount": {  
Ê   "rate": 0.1,  
Ê   "by_number_of_views": {  
Ê     "views": 5,  
Ê     "duration_in_seconds": 30  
Ê   }  
Ê }  
}
```

## 4. Running the application

### 4.1. Prerequisites

1. Bash
2. Java
3. [Docker](#)

### 4.2. Version Information

These were the versions used during development:

```
$ echo $BASH_VERSION
5.2.21(1)-release

$ java --version
openjdk 21.0.6 2025-01-21 LTS
OpenJDK Runtime Environment Temurin-21.0.6+7 (build 21.0.6+7-LTS)
OpenJDK 64-Bit Server VM Temurin-21.0.6+7 (build 21.0.6+7-LTS, mixed mode, sharing)

$ docker --version
Docker version 27.3.1, build ce12230
```

!

[Kafka Streams](#) is fully supported by Java 21. See this page: <https://kafka.apache.org/documentation/#java>

### 4.3. Running manually

#### 4.3.1. Starting Redpanda

First, you need to start Redpanda using `docker compose`:

```
$ docker compose -f compose.redpanda.yaml up -d # <- same effect as ./redpanda.sh up
```

!

When you're done, use this command to stop Redpanda and remove all data:

```
$ docker compose -f compose.redpanda.yaml down -v --remove-orphans # <-
same effect as ./redpanda.sh down
```

#### 4.3.2. Running the application

The application can be executed using the provided [run.sh](#) script, which handles building and



running the application:

Start the application with an existing JAR:

```
$ ./run.sh
```

!

You can force a rebuild before running the application:

```
$ ./run.sh --build
```

The `run.sh` script will:

- ¥ Build the application if the JAR doesn't exist or if `--build` is specified
- ¥ Configure appropriate JVM options
- ¥ Handle graceful shutdown on SIGTERM/SIGINT
- ¥ Display colored status messages during execution

!

The script automatically manages the application lifecycle and provides proper cleanup on shutdown.

### 4.3.3. Generating events

To generate events in order to trigger discounts, use [the Simulator project](#). You can use it to generate events (containing `product_view` and `page_ping` events in JSONL format) and send them to Redpanda.

So, the file [data-samples/long.jsonl](#) is an example of such a file. You can send the events in this file to the input topic using the following command:

```
$ docker exec -i redpanda rpk topic produce snowplow-enriched-good < \
  Ê data-samples/long.jsonl # <- same effect as ./redpanda.sh produce
```

!

1. The command above is to produce test events for testing the [Continuous View Discount Processor](#). To test the [Most Viewed Product Discount Processor](#), use the command `data_type=frequent ./redpanda.sh produce`.
2. Using the `tstamp-diff.sh` script (available in main project) you can verify that the time difference between the collector timestamps for the `page_ping` events in this file is greater than 90 seconds as per the rule. Therefore, these `page_ping` events on it should generate a discount event according to [the rule](#).

```
$ {
  Ê f=data-samples/long.jsonl
  Ê start=$(sed -n 2p $f | jq -r .collector_timestamp)
```

```
Ê end=$(sed -n 11p $f | jq -r .collector_timestamp)
Ê ../scripts/tstamp-diff.sh $start $end
}
90.075
```

#### 4.3.4. Verifying discounts

To verify that discounts are being generated correctly, consume from the output topic:

```
$ docker exec -it redpanda rpk topic consume shopper-discounts # <- same effect as
./redpanda.sh consume
```

You should see discount events in the output that match the expected patterns based on the input events.

!

You can also open the Redpanda console at <http://localhost:8080> to observe each of the events produced in the shopper-discounts topic.

## 4.4. Running via Docker Compose

To run the application, type:

```
$ docker compose up --build -d
```

Watch the logs to ensure the application is running correctly:

```
$ docker compose logs discounts-processor -f
```

Generate events as described in [Generating events](#).

Verify discounts as described in [Verifying discounts](#).

To stop the application and remove the containers, type:

```
$ docker compose down -v --remove-orphans
```

## 5. Testing procedures

### 5.1. Unit tests

Unit tests verify the core business logic of the discount processors without external dependencies.

To run all unit and mock tests:

```
$ ./gradlew test
```

!

Since all tests are mocked, there is no need to start Redpanda.

### 5.2. Mock Tests

These are the two mock tests created for the [discount processors](#):

¥ [src/test/kotlin/com/example/processor/ContinuousViewProcessorTest.kt::](#)

¥ [src/test/kotlin/com/example/processor/MostViewedProcessorTest.kt::](#)

To run a specific test class (e.g., [DiscountEventSerdeTest](#)):

```
$ ./gradlew test --tests "com.example.serialization.DiscountEventSerdeTest"
```

To run a mocked test for one of the two [discount processors](#):

```
$ ./gradlew test --tests "com.example.processor.MostViewedProcessorTest"
```

## 6. Discount processors

This project contains two discount processors:

[src/main/java/com/example/processor/ContinuousViewProcessor.java](#)

Cover all the rules for the [Continuous View Discount](#).

Test code: [ContinuousViewProcessorTest](#)

[src/main/java/com/example/processor/MostViewedProcessor.java](#)

Cover all the rules for the [Most Viewed Product Discount](#).

Test code: [MostViewedProcessorTest](#)

# 7. Troubleshooting

## 7.1. Common Issues

- ¥ Connection issues: Verify that you [started Redpanda](#).
- ¥ No discounts generated: Ensure that enough events are being sent to trigger the [discount conditions](#).
- ¥ Serialization errors: Check that the event format matches [the expected schema](#).

## 7.2. Logs

Application logs can be configured in two files depending on the environment (main or test):

1. [logback.xml](#)
2. [logback-test.xml](#)

# 8. Developer Guide

## 8.1. Developer Tips

### 8.1.1. Gradle Commands

#### Skipping Tests

To skip test execution during build:

```
$ ./gradlew build -x test
```

#### Code Formatting

The project uses Spotless for code formatting. Common commands:

```
$ ./gradlew spotlessCheck    # Check code formatting
$ ./gradlew spotlessApply    # Apply code formatting
```

!

To automatically format code before each build, the project already includes `spotlessApply` as a build dependency.

#### Running Specific Tests

To run a specific test class:

```
$ ./gradlew test --tests "com.example.processor.MostViewedProcessorTest"
```

To run only integration tests:

```
$ ./gradlew integrationTest
```

### 8.1.2. IDE Configuration

#### IntelliJ IDEA

TODO

#### VS Code

¥ Install "[EditorConfig](#)"

! Configure "Editor: Format On Save" setting

¥ Install "[Java extensions for Visual Studio Code](#)"

! Install "[SonarQube for IDE](#)"

! Install "[Gradle for Java](#)"

¥ Install "[Kotlin Language](#)"

¥ Install "[AsciiDoc](#)"

### 8.1.3. Documentation

#### README Generation

To rebuild the documentation:

```
$ ./README.sh    # Generates README.html and updates other formats
```

### 8.1.4. Docker Tips

#### Clean Environment

To completely clean up Docker resources:

```
$ docker compose down -v --remove-orphans
$ docker system prune -f    # Remove unused containers/images
```

#### Quick Redpanda Access

The project includes convenient scripts for Redpanda operations:

```
$ ./redpanda.sh up    # Start Redpanda
$ ./redpanda.sh down  # Stop Redpanda
```

---

[1] It only relies on scripts that generate documentation.