PINPOINT INCREMENTAL ANALYTICS

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Pinpoint – Incremental Events with Period Based Filtering

Contents

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Solution Summary

Background

Tracking users' activity is vital for understanding your customers and identifying opportunities. In a data driven world, having actionable data is fundamental but being able to feed these data into your marketing platforms and use them in business logic often comes as a challenge. It is not uncommon for companies in such situations to either resort in manual processes resulting in missed opportunities or try to build something in-house, which won't be scalable. Currently Pinpoint cannot aggregate events neither create segments based on an event's count for a specific period.

Solution

This solution expands Pinpoint's existing segmentation and event based journey capabilities, allowing creation of business rules on events' count and of summed metric value per user with the possibility to add date filters. When a rule is met, a user attribute with the event name will be updated to "Ready" or an event with the name trk_event will be fired depending the needs of the Pinpoint user. Business rules will be added through HoneyCode and will require zero coding experience.

Use case(s)

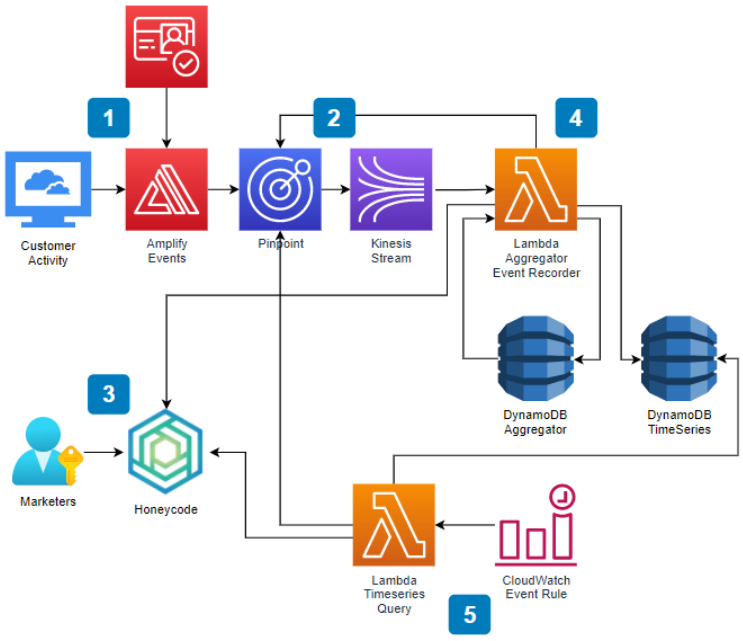
Pinpoint uses events to trigger Journeys or to create dynamic segments. The latter features do not support the calculation of metrics e.g. sum of all previous purchases or number of page views on a specific section of the site. If a user would like to trigger an event based journey or create a dynamic segment in a case like the examples above, then they would need to calculate this on their side and send the final result to Pinpoint. Furthermore Pinpoint does not support the creation of segments based on event calculation (count or metric sum) for a specific date range e.g. users who have completed more than 10 orders between YYYY-MM-DD and YYYY-MM-DD.

Considerations

1) You will need to install Amplify SDK for sending events to Pinpoint and Cognito for user management
2) Only custom metrics are being processed at the moment
3) The rules set do not take into consideration any event attribute, thus the event needs to be explicit itself e.g. event=pageview-homepage and not event=pageview and event_attribute=homepage
4) HoneyCode is available only in Oregon (us-west-2) region at the moment but the solution will work in any region
5) When you insert a rule that is using the date filters in Honeycode you will need to wait till it performs its first scan based on the CloudWatch Event Rule scheduling settings. By default, the project sets the CloudWatch Event Rule interval to 60 minutes
6) This version of the solution does not offer relative date filtering such as last month, last week. It only offers period between dates, where the dates can also be in the future. Note that the date format needs to be strictly YYYY-MM-DD
7) The Lambda used for time series querying is using Pandas library as a Layer (ARN of the layer is public)
8) All metric calculations and user attribute changes are made on a user level and NOT on an endpoint level

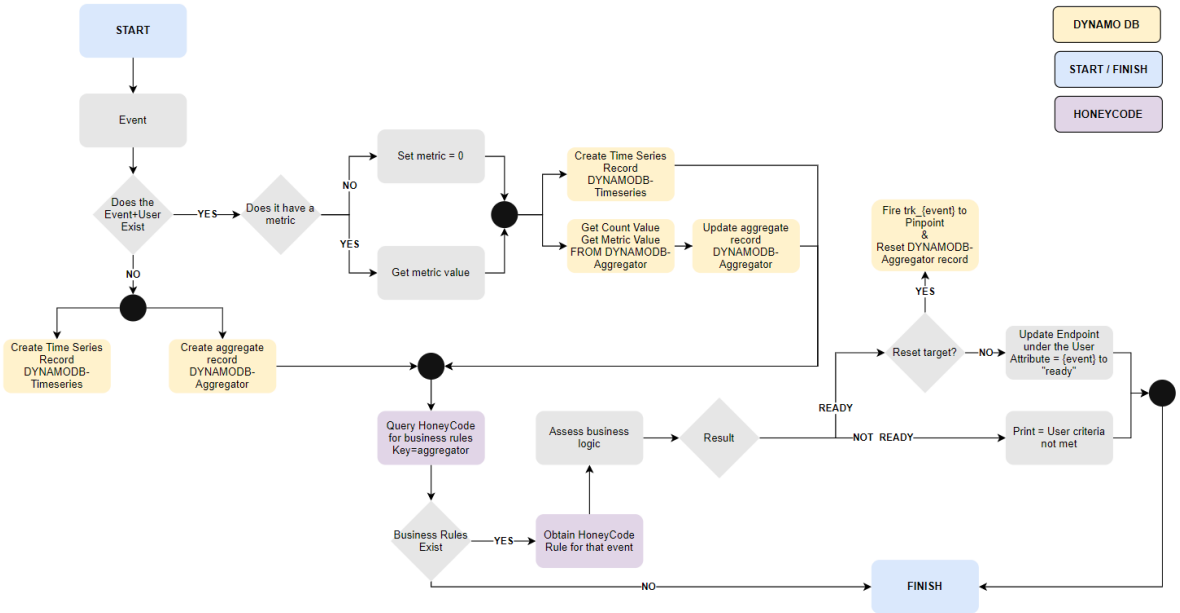
Solution Architecture & Business Logic

Solution Architecture

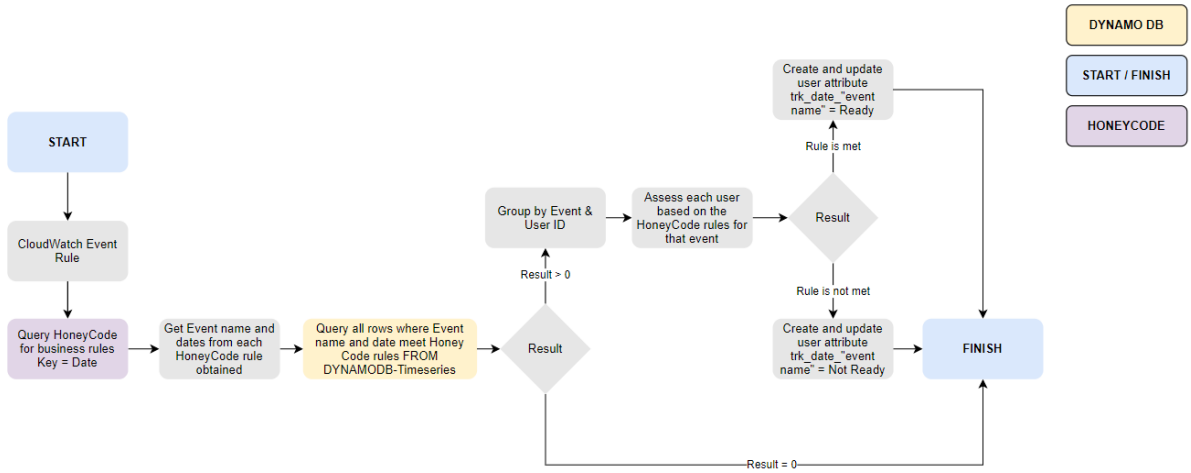


1. Using Amplify SDK and Cognito, you can send custom events to Pinpoint that are enriched with User ID (for logged in users)
2. An existing Pinpoint features allows to stream all Pinpoint event through Kinesis Stream. This solution can create an existing Pinpoint Kinesis Stream or if there isn't one it will create a new one
3. Honeycode will function as a visual interface for business users, where business users / marketers can input business rules that will define the target value for an event (count or sum) per user and if that target should be reset after it has been reached e.g. if cars pageview > 50
   Another type of business utilizes dates, where users can set a date range and a target for that event e.g. all users who clicked more than 3 times on a car between 2021-01-10 and 2021-02-12
4. Lambda Aggregator - Event Recorder will be processing all Pinpoint custom events and based on the business rules set by the users in Honeycode it will perform a put or update function to the two DynamoDB tables. DynamoDB aggregator will aggregate records by user & event while DynamoDB timeseries will be recording each event by date, timestamp and user ID. When criteria are met, a Pinpoint user attribute with the name of the event will be updated from "not-ready" to "ready". This will allow business users to setup event based journeys or dynamic segments
5. Lambda Timeseries Query will be triggered by a CloudWatch Event Rule every 60 minutes (can be changed) and query Honeycode for business rules. Based on the business rules obtained it will then query DynamoDB Timeseries and if any users meet the criteria then a user attribute with the name of the event trk_date_eventname will be updated to "Ready"

Business logic for Lambda Aggregator



Business logic for Lambda TimeSeries



Steps to implement the solution

Step 1 – Create AWS account & Pinpoint Project

If you have an AWS account and Pinpoint Project setup already please move to step 2

Create an AWS account

Create a Pinpoint project

Step 2 – Create S3 bucket for Lambda code and upload the Zip files

Create an S3 bucket in the region that you have your Pinpoint projects and provide it a unique name

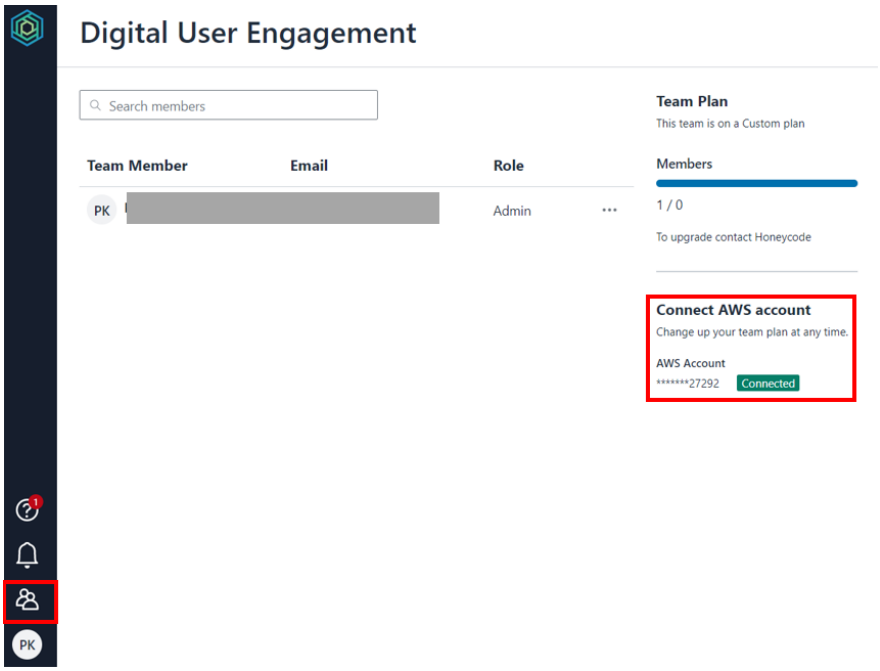
Upload in the root folder the 2 zip files: lambda_aggregator.zip and lambda_timeseries.zip

Step 3 – Create HoneyCode account and workbook

On the AWS console, select region US West (Oregon) us-west-2 and click on “Sign up for Honeycode”

Note: HoneyCode is a standalone app and an AWS service that charges separately and you will need to link it to your AWS account for the purpose of this solution

When the HoneyCode application loads, click on the 3rd icon from the top to bottom on the navigation bar and connect your AWS account



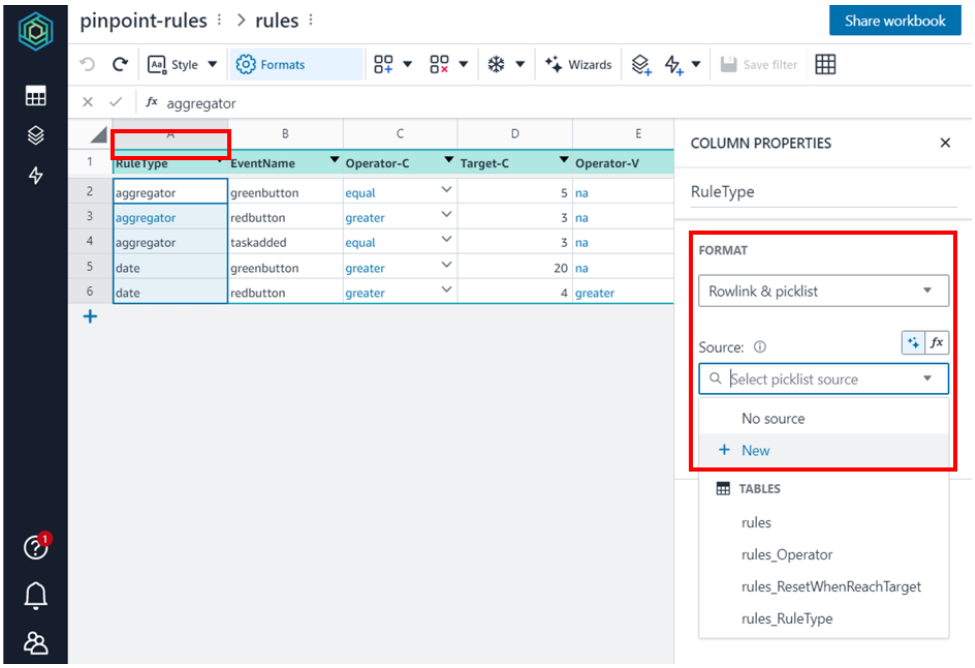
Once you have linked your HoneyCode account with your AWS account, return to the HoneyCode homepage (https://builder.honeycode.aws/) and click up right “Create workbook”

Select “Start from scratch” option

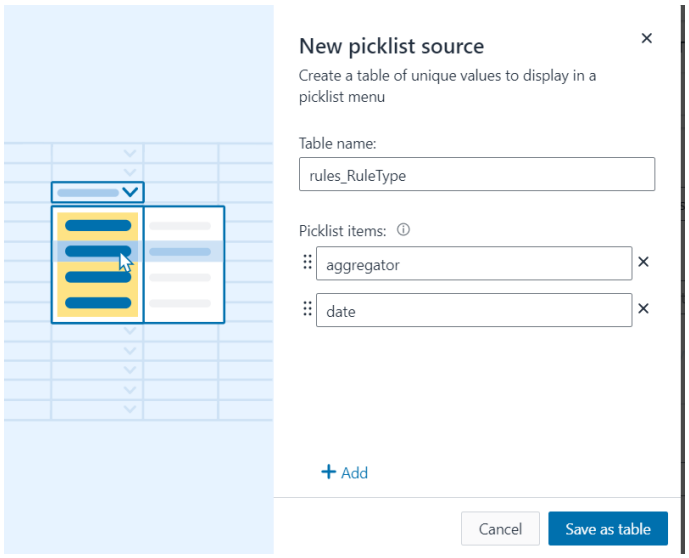
Provide a name to your workbook and select the team you want to link it with

Note: For the table we will create, some columns will be using dropdowns with pre-selected values. To create such dropdowns, click right click on the column letter and select “Format…”. A sliding bar

from the right side should appear with title “COLUMN PROPERTIES”, select the option “New” under the “Source” list



The latter will create a new table, where for the source value. Provide a table name and the values you would like on the dropdown (example below for the column “RuleType”)



Create the following columns with the exact names and order:

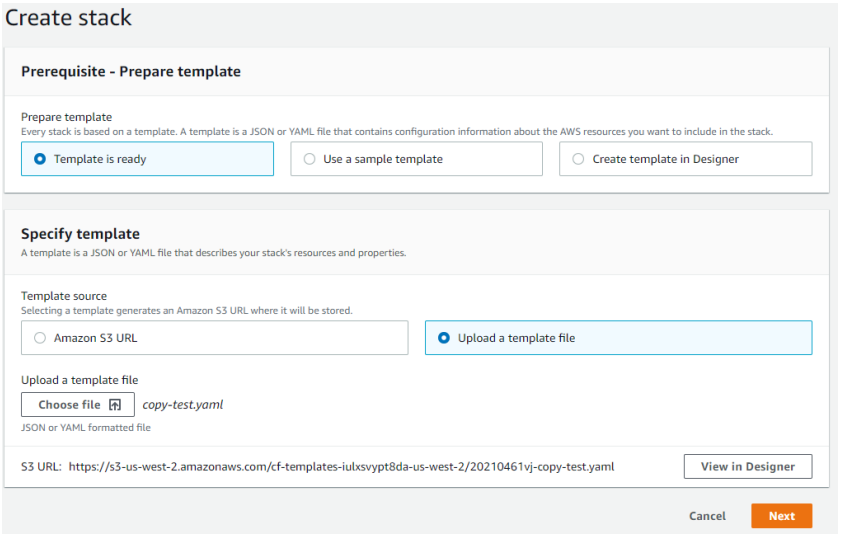
- **RuleType:**
  - Format: Rowlink & picklist
  - Dropdown values: aggregator, date
- **EventName:**
  - Format: Auto
- **Operator-C:**
  - Format: Rowlink & picklist
  - Dropdown values: equal, greater

- **Target-C:**
  - Format: Number
  - Decimal Places: 0
- **Operator-V:**
  - Format: Rowlink & picklist
  - Dropdown values: equal, greater
- **Target-V:**
  - Format: Number
  - Decimal Places: 0
- **ResetWhenReachTarget:**
  - Format: Rowlink & picklist
  - Dropdown values: yes, no
- **StartDate:**
  - Format: Plain text
- **FinishDate:**
  - Format: Plain text
- **Key:**
  - Format: Auto
  - Formula: =CONCATENATE([RuleType],[EventName])

Step 4 – Create Cloudformation Stack

Navigate to Cloudfromation page in AWS console, click up right on “Create stack” and select the option “With new resources (standard)”

Leave the “Prerequisite – Prepare template” to “Template is ready” and for the “Specify template” option, select “Upload a template file”. On the same page, click on “Choose file”, browse to find the file “incremental_analytics_pinpoint.yaml” file and select it. Once the file is uploaded, click “Next”

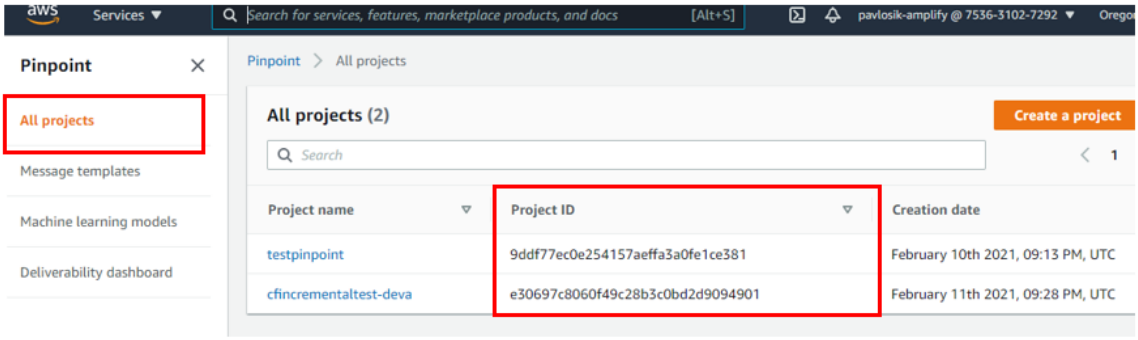


See below information for each of the 6 fields under the section “Specify stack details”:

1) **Stack name:** Provide a name of your preference for that Cloudformation stack
2) **EventStreamARN:** If you already have a Pinpoint Kinesis stream setup for the project you want to implement this stack, then copy paste its ARN otherwise leave it empty and a new Pinpoint Event Stream will be created as part of this Cloudformation stack

3) **HoneyCodeTableID:** Open the HoneyCode workbook and copy the URL, it should look like this “https://builder.honeycode.aws/table/1-us-west-2%3A122162422134%3Atable%3A111c6cea-af2a-41bb-ba31-92759c730076%2F636dfdb5-232b-468f-890c-92de2ae1c87a” . The first underlined part after the letter “A” and before “%” is the workbook ID and the second underlined part from letter “F” and till the end is the table ID
4) **HoneyCodeWorkbookID:** Open the HoneyCode workbook and copy the URL, it should look like this “https://builder.honeycode.aws/table/1-us-west-2%3A122162422134%3Atable%3A111c6cea-af2a-41bb-ba31-92759c730076%2F636dfdb5-232b-468f-890c-92de2ae1c87a” . The first underlined part after the letter “A” and before “%” is the workbook ID and the second underlined part from letter “F” and till the end is the table ID
5) **LambdaCodeBucketName:** Type the name of the S3 bucket from step 2
6) **PinpointProjectId:** Copy paste the Pinpoint Project ID, which you can find on the Pinpoint console page under “All projects”

a.



Once all fields completed, click “Next”

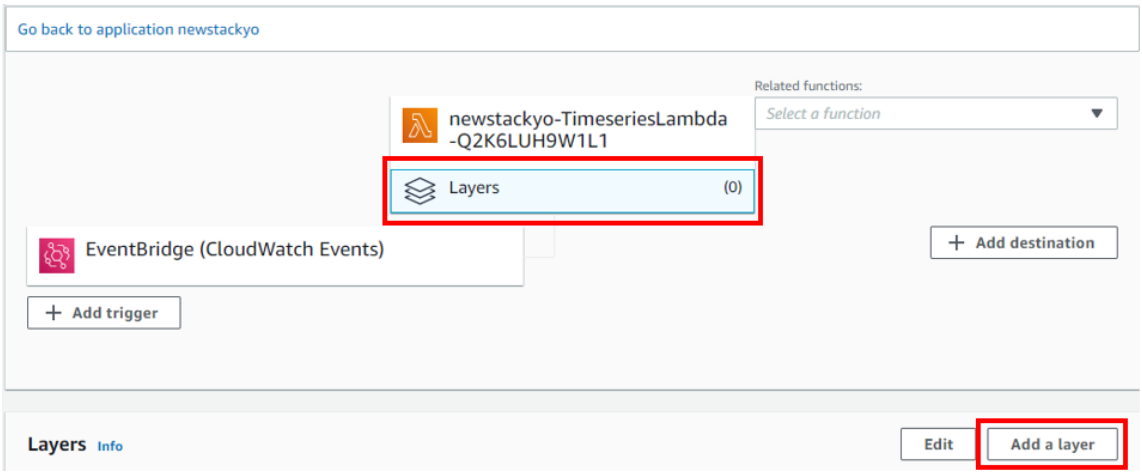
On the “Configure stack options” page, click “Next”

On the “Review [StackName]” page, check the checkbox “I acknowledge that AWS CloudFormation might create IAM resources.” And then click on “Create stack”

Step 5 – Create Lambda Layer

Once step 4 is completed successfully, navigate to Lambda => Functions and click on the function name that starts with “[StackName]-TimeseriesLambda-”

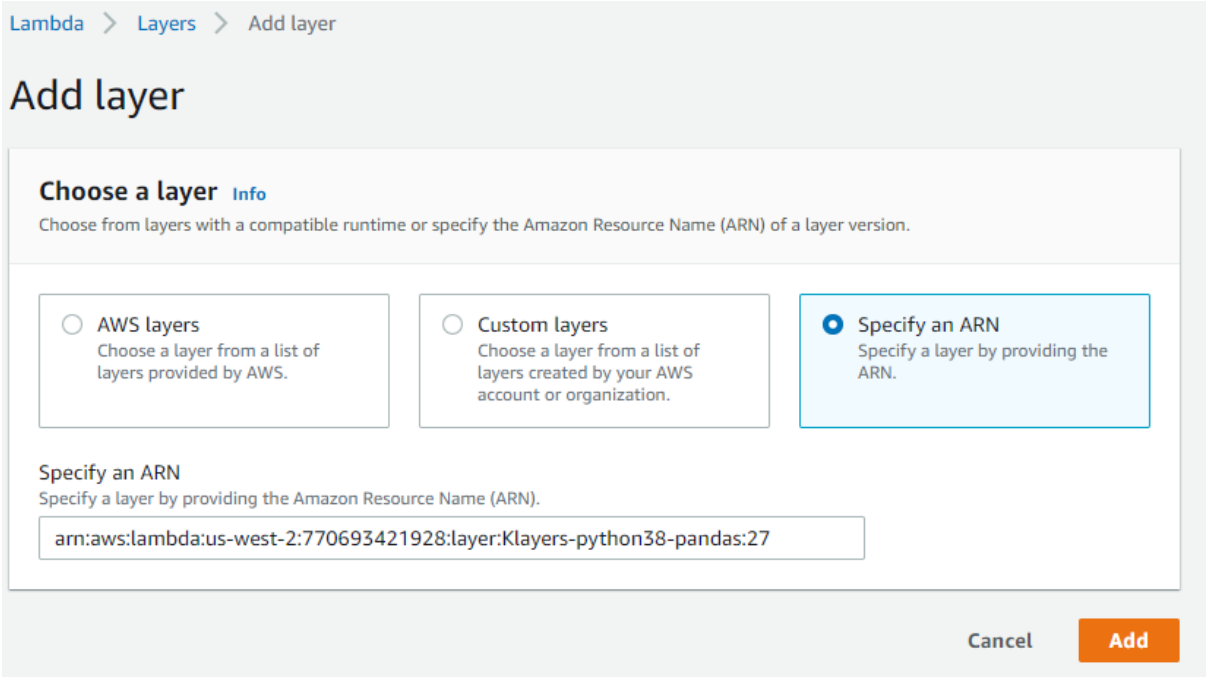
Click on the “Layers” and then click on “Add a layer”



Depending the Region you have deployed the stack, visit this [Github page](), select the respective Region from the list and click on it. Scroll down the list, find where the column “Package” = Pandas and select the “Package Version” = Latest

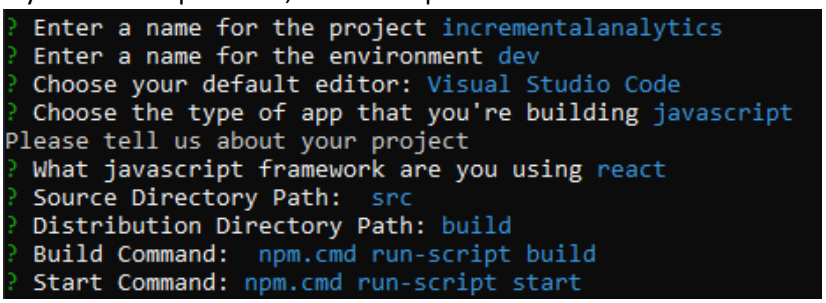
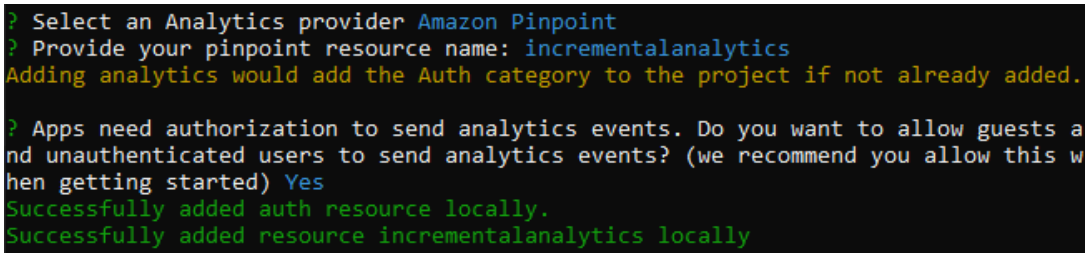
168	pandas	1.1.5	deprecated	2021-02-26T02:03:31	arn:aws:lambda:us-west-2:770693421928:layer:Klayers-python38-pandas:22
169	pandas	1.2.0	deprecated	2021-03-12T02:04:25	arn:aws:lambda:us-west-2:770693421928:layer:Klayers-python38-pandas:23
170	pandas	1.2.0	deprecated	2021-03-26T02:01:27	arn:aws:lambda:us-west-2:770693421928:layer:Klayers-python38-pandas:24
171	pandas	1.2.1	deprecated	2021-04-02T02:04:32	arn:aws:lambda:us-west-2:770693421928:layer:Klayers-python38-pandas:25
172	pandas	1.2.1	deprecated	2021-04-09T02:04:45	arn:aws:lambda:us-west-2:770693421928:layer:Klayers-python38-pandas:26
173	pandas	1.2.1	latest		arn:aws:lambda:us-west-2:770693421928:layer:Klayers-python38-pandas:27

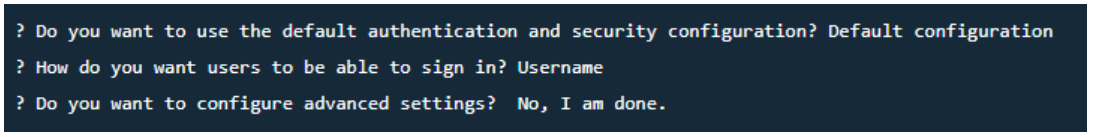
When creating the Lambda Layer, select the option “Specify ARN” paste the ARN obtained from the step above and click “Add”



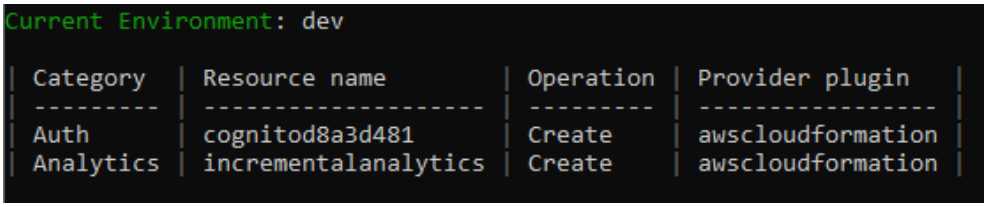
Steps to test the solution - WIP

To test the solution you will require to have a web or native application that is generating Pinpoint events and uses Cognito for user management. If you don't have the above and you wish to test the functionality, then follow the steps listed below:

1) On your desktop create a folder and name it "Incremental_Analytics_Pinpoint"
2) Open the command prompt or Powershell if you are in Windows, navigate to the folder "Incremental_Analytics_Pinpoint", there type and execute: npx create-react-app incrementalanalytics
3) The above step will create a new React web application with the name of "incrementalanalytics"
4) Browse to the folder "incrementalanalytics"
5) Type and execute "amplify init"
6) It will ask you a set of questions, answer as per the sceenshot below:
   a. 
```
? Enter a name for the project incrementalanalytics
? Enter a name for the environment dev
? Choose your default editor: Visual Studio Code
? Choose the type of app that you're building javascript
Please tell us about your project
? What javascript framework are you using react
? Source Directory Path:  src
? Distribution Directory Path: build
? Build Command:  npm.cmd run-script build
? Start Command: npm.cmd run-script start
```
7) To the question "Do you want to use an AWS profile?" answer Yes and select the profile you would like to have this solution implemented
8) Once the above step is completed, type and execute:
   a. Amplify add analytics:
      i. 
```
? Select an Analytics provider Amazon Pinpoint
? Provide your pinpoint resource name: incrementalanalytics
Adding analytics would add the Auth category to the project if not already added.

? Apps need authorization to send analytics events. Do you want to allow guests a
nd unauthenticated users to send analytics events? (we recommend you allow this w
hen getting started) Yes
Successfully added auth resource locally.
Successfully added resource incrementalanalytics locally
```
   b. Amplify add auth:
      i. 
```
? Do you want to use the default authentication and security configuration? Default configuration

? How do you want users to be able to sign in? Username

? Do you want to configure advanced settings?  No, I am done.
```
9) Type and execute: Amplify status. You should see that there are 2 resources with Operation = Create
   a. 
```
Current Environment: dev

| Category  | Resource name          | Operation | Provider plugin   |
| --------- | ---------------------- | --------- | ----------------- |
| Auth      | cognitod8a3d481        | Create    | awscloudformation |
| Analytics | incrementalanalytics   | Create    | awscloudformation |
```
10) Type and execute: Amplify push. In the question "Are you sure you want to continue?" type Y and press Enter

a.

```
Current Environment: dev

| Category  | Resource name          | Operation | Provider plugin    |
| --------- | ---------------------- | --------- | ------------------ |
| Auth      | cognitod8a3d481        | Create    | awscloudformation  |
| Analytics | incrementalanalytics   | Create    | awscloudformation  |
? Are you sure you want to continue? Yes
```

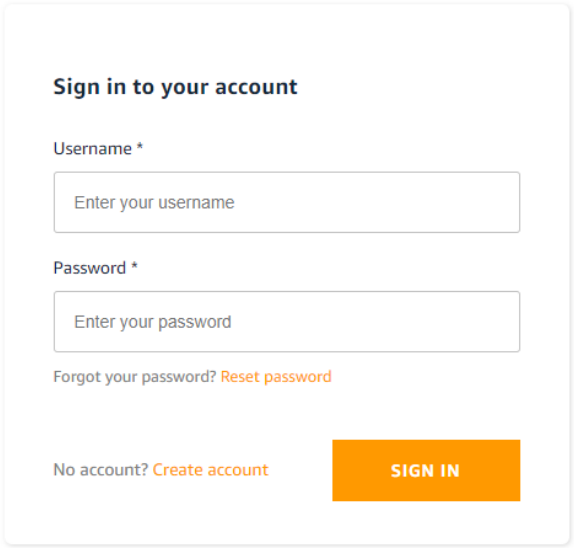
11) Type and execute: npm install aws-amplify @aws-amplify/ui-react
12) Type and execute: npm install react-bootstrap bootstrap
13) Exit the comand prompt or Power Shell and go to the project folder, which should have the below contents

a.

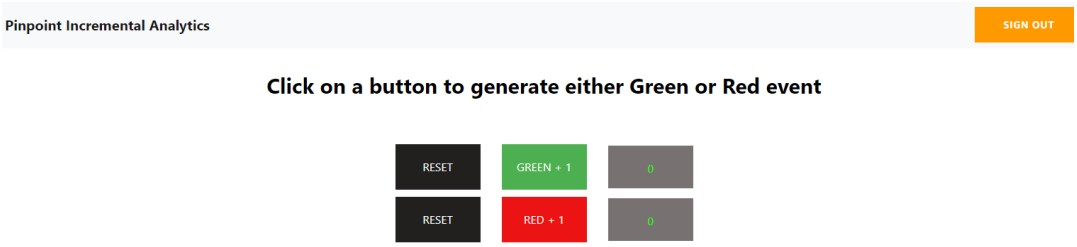
Name	Date modified	Type	Size
.vscode	11/02/2021 21:07	File folder	
amplify	11/02/2021 22:00	File folder	
build	11/02/2021 21:55	File folder	
node_modules	11/02/2021 21:47	File folder	
public	11/02/2021 21:06	File folder	
src	11/02/2021 21:09	File folder	
.gitignore	11/02/2021 21:09	GITIGNORE File	1 KB
package	11/02/2021 21:47	JSON File	1 KB
package-lock	11/02/2021 21:47	JSON File	756 KB
README.md	11/02/2021 21:06	MD File	4 KB
yarn.lock	11/02/2021 21:07	LOCK File	495 KB

14) Open the “scr” folder, paste & replace the App.js and index.css files with these two
15) Go back and open the “public” folder, paste & replace the index.html file with this one
16) Open the comand prompt or Power Shell, navigate to the app folder “Incremental_Analytics_Pinpoint”, type and execute: npm start
17) The above should open your default browser localhost:3000 and display the below:

a.



18) Click on Create account, fill all information required and click on “Create Account”
19) You should receive the activation code on the email you used to sign-up, enter it and click “Activate”
20) Once you are logged in, you should see the screen below:



a.

21) When clicking either “Green” or “Red” a Pinpoint event with name greenbutton and redbutton respectively will fire
    a. Note: Both events have a metric value of 1

How to use the solution

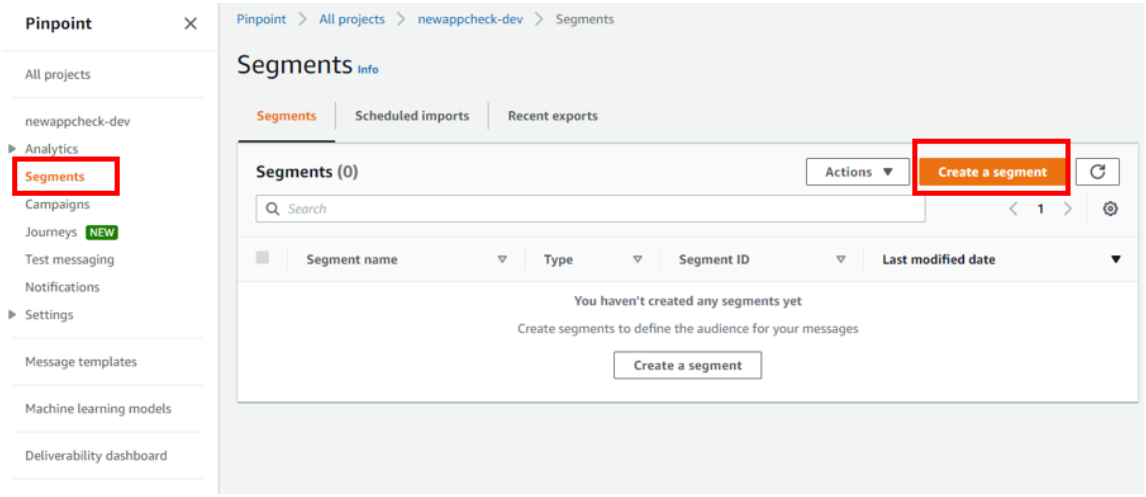
Case 1 – Move users to segment based on event count / metric sum target

Description: Move customers to a specific segment when the count or metric sum of an event equals or is greater than a specific value

Example: Users who have purchased X product more than 5 times should move to a dynamic segment “Users with interest in X”

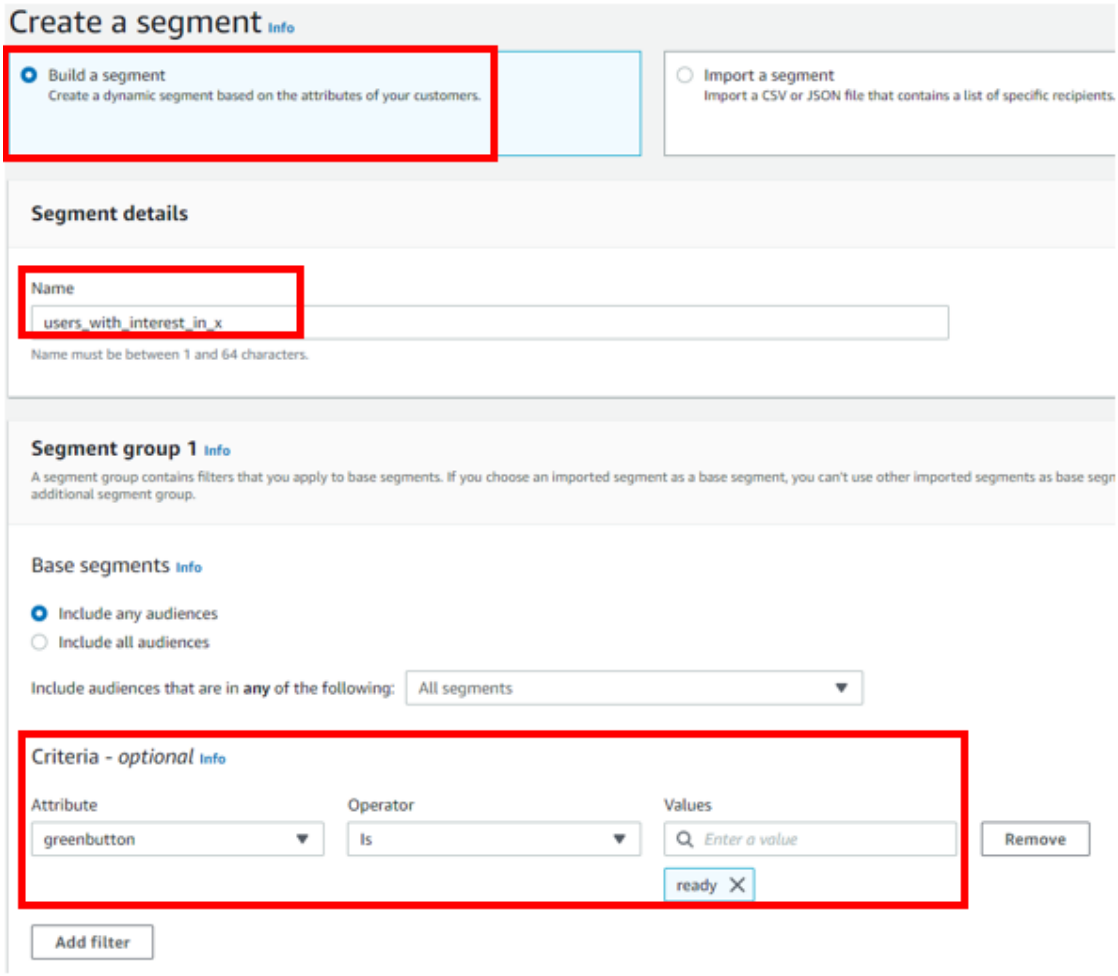
Execution:

1) Get the name of the event you want to include in the rule
2) Go to HoneyCode and add a new row in the “rules’” table
    a. Select RuleType = aggregator
    b. Enter the EventName
    c. Select Operator-C = greater, Target-C = 5
    d. Select Operator-V = na, Target-V = 0
    e. Select ResetWhenReachTarget = no
    f. For StartDate & FinishDate type 9999-99-99
    g. The column Key will populate automatically
3) Go to your Pinpoint project, click on Segments and then Create a segment
    a.



4) In the segment page, select “Build a segment”, give the name “users_with_interest_in_x” and select the attribute with name of the event, Operator = is and Values = ready. NOTE: The attribute won’t appear till at least one user meets the criteria set in HoneyCode. For the latter to happen, you might need to wait till at least a user gets qualified.

a.



Case 2 – Qualify users for a Pinpoint Journey every time an event count / metric sum meets the target

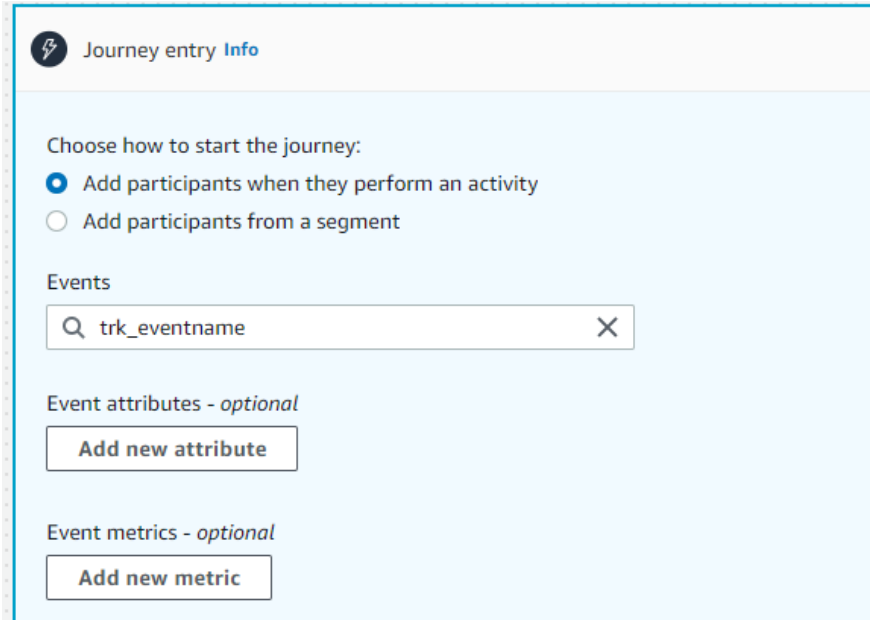
Description: Have the ability to trigger an event when a rule is met (event count or metric sum) and reset the count / sum

Example: Every time a user completes 3 courses in an e-learning platform, send them an email to congratulate them

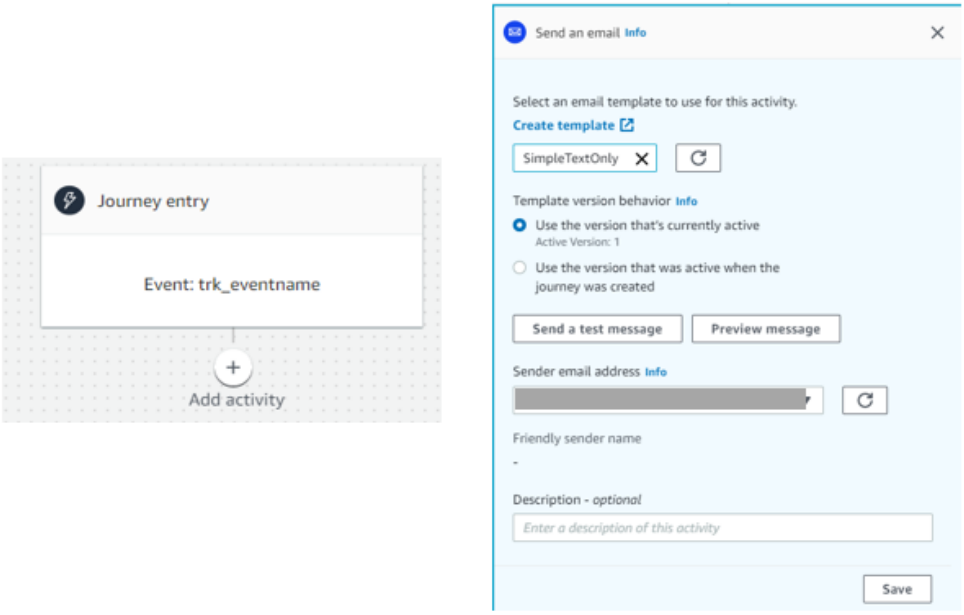
Execution:

1) Get the name of the event you want to include in the rule
2) Go to HoneyCode and add a new row in the "rules'" table
    a. Select RuleType = aggregator
    b. Enter the EventName
    c. Select Operator-C = greater, Target-C = 3
    d. Select Operator-V = na, Target-V = 0
    e. Select ResetWhenReachTarget = yes
    f. For StartDate & FinishDate type 9999-99-99
    g. The column Key will populate automatically
3) Go to the Pinpoint project and create a Journey

4) For the Journey Entry, select the journey to start option “Add participants when they perform an activity” and for the Events, type the event name but with trk_ in front of it e.g. trk_eventname. NOTE: The event might not appear in the list but you can type it

a. 

5) Click on Add activity and select Send email. You will need to have Email channel enabled for this project and a ready email template

a. 

6) Click “Save”
7) Click on the “Actions” top right of the screen and select “Settings”. On the overlay that will appear, enter a “Journey title”, Start / End data and click to expand “Advanced settings – optional”
8) In this section you should change the “Journey limits” and “Maximum entries per endpoint” to numbers higher than 0, since you would like users to receive an email every time they complete 3 courses, which will result to multiple Journey entries

Case 3 – Move users to a segment based on event count / metric sum target for a specific time period

Description: Move customers to a specific segment when the count or metric sum of an event equals or is greater than a specific value for a specific time period

Example: Users who have spent X $500 between 2021-01-01 and 2021-02-01 should move to a dynamic segment “Users with interest in X”

Execution:

1) Get the name of the event you want to include in the rule
2) Go to HoneyCode and add a new row in the “rules’” table
    a. Select RuleType = date
    b. Enter the EventName
    c. Select Operator-C = na, Target-C = 0
    d. Select Operator-V = greater, Target-V = 500
    e. Select ResetWhenReachTarget = no
    f. StartDate = 2021-01-01
    g. FinishDate = 2021-02-01
    h. The column Key will populate automatically
3) All rules where RuleType = date will be evaluated automatically every 60 minutes (default value) based on a CloudWatch Event Rule named “TriggerTimeseriesLambda”
    a. 

4) If you want to change the interval, click on the rule in the CloudWatch page then from the upright Actions => Edit and under the “Event Source” section you will see that the option “Schedule” is preselected and the “Fixed rate of” is set to 60 minutes
    a.