Movie-C Solution

Assumptions

The system is designed based in the following assumptions:

- A movie is update regularly by each data source.
- The movies contains a unique id that is shared through all data sources. (movie_id)

Architecture

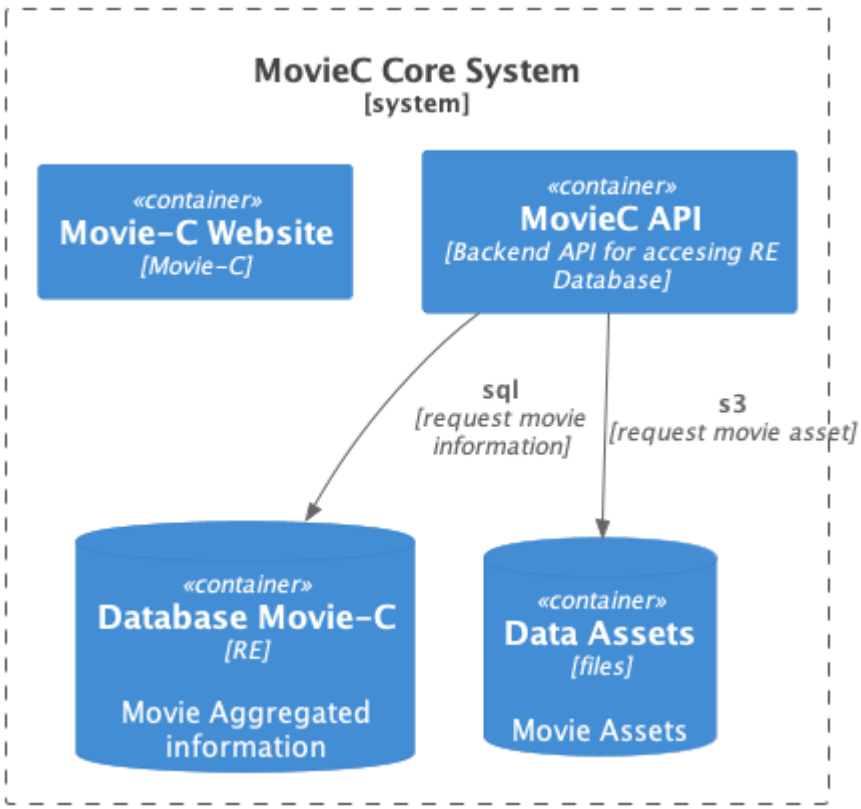
The architecture is divided in 3 systems:

- web system
- extractor
- aggregator

Architecture Web

I choose to use a web architecture because allow to centralize business logic in one single executor, it is easy to make adjustments and improvements and also centralizes the monitoring of the system.

Also one key advantage is that the core aggregation mechanism is not part of the web system making it more robust to failure from the aggregator system



- **Database**: Saved all the data need by the system to stored the aggregated information from all the data sources
- **Bucket**: Store assets like images, or small videos or trailers if is need it.

- **API**: it contains the backend and the apis that support the web page.
- **Website**: contains all the assets for web distribution through a web browser.

Notes: Using a relation database we can protect the data updates by accessing only through API.

Architecture Extractor

The Extractor gets the data from data sources and transform in entities that can be used for aggregation.

For creating such process we need to introduce certain concepts that allow us to ensure the quality of the data:

Entity Uniqueness

How to ensure that one movie is the same movie in all data sources? Define a way to identified the movie in a unique way? is there an id that can be used for all the data sources? The system needs to define an algorithm that can be used for all the data sources to be able to match them (is this movie A the same movie A in this data source?)

A `movie id` is an id that can be used for matching movies in all data sources.

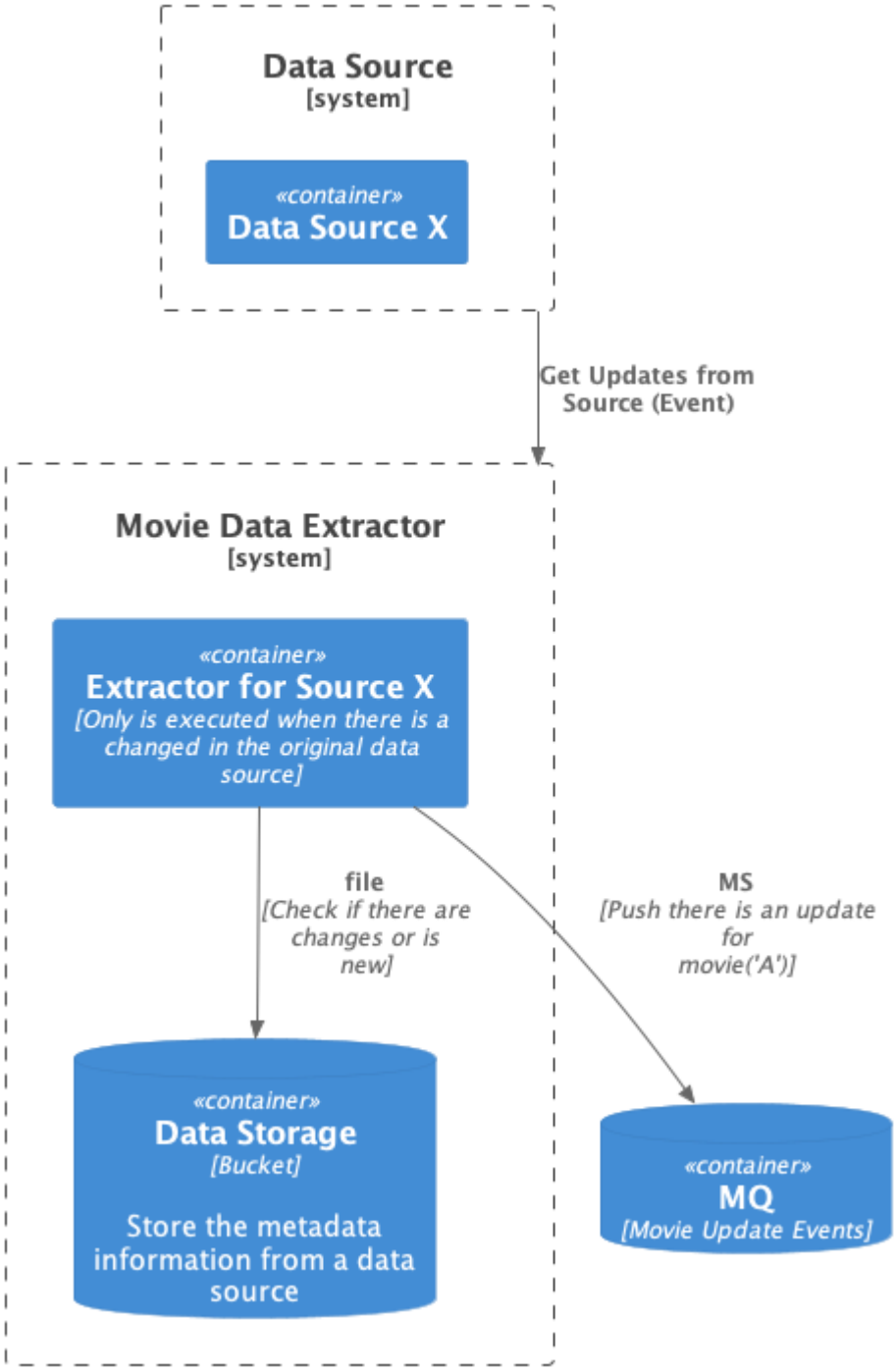
Note: This is going to cover the majority of the movies, but there is always going to be some movies that we can not match between data sources, Is suggested to have a log table where we can check what movies are we not able to get the id, and what is the percentage in the overall data source.

Movie Metadata

What data is relevant and how the metadata can be override. Define rules for each field that defines a movie, also consider scenarios what happened if the data rewrites information as empty or not data should we also saved as empty?

Extractor Pipeline.

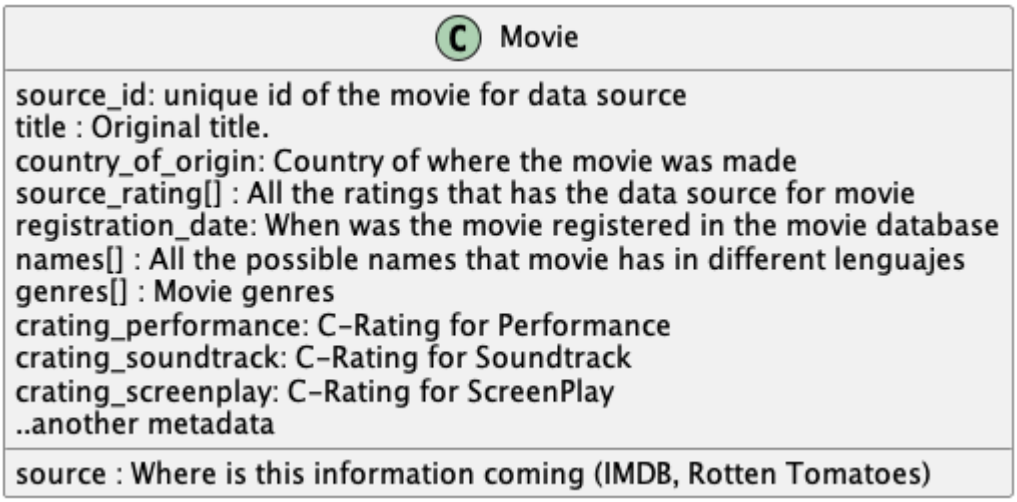
We can define the same blueprint for all data sources pipeline:



The source updates can be trigger by an SFTP server or by an scheduler. This can be implemented using technologies like S3 where we can trigger a serverless function when an update happened in one file in the bucket.

Note: For big updates like the first runs, (big csv files for example) in a data sources this can be a task that is not able to be run in a normal container or a serverless function because of the memory restrictions, is suggested to used technologies like spark that can be run serverless in AWS using glue jobs.

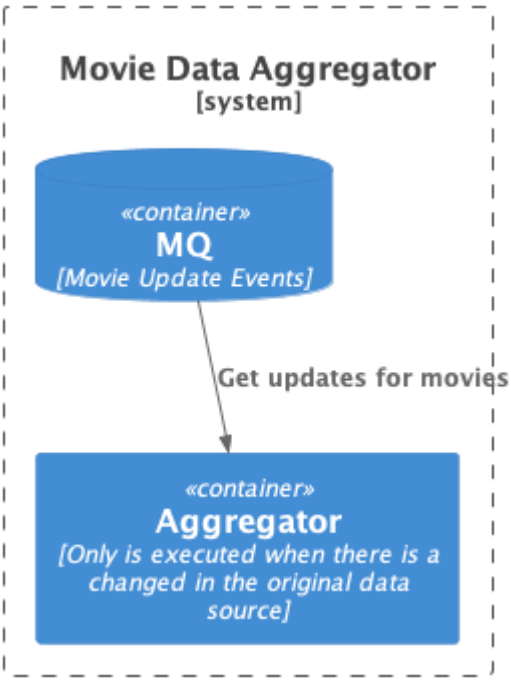
All data sources needs to follow the same schema, This allow the system to compare data sources that has similar data and also define what information is strictly required for been able to use it in the aggregation algorithm.



- Each data sources saves the movie information in the `Aggregated Storage`.
- Each time there is a **changed** in the data, the system is notified through an event `notified_movie_has_updates('movie_id')`.

Architecture Aggregator

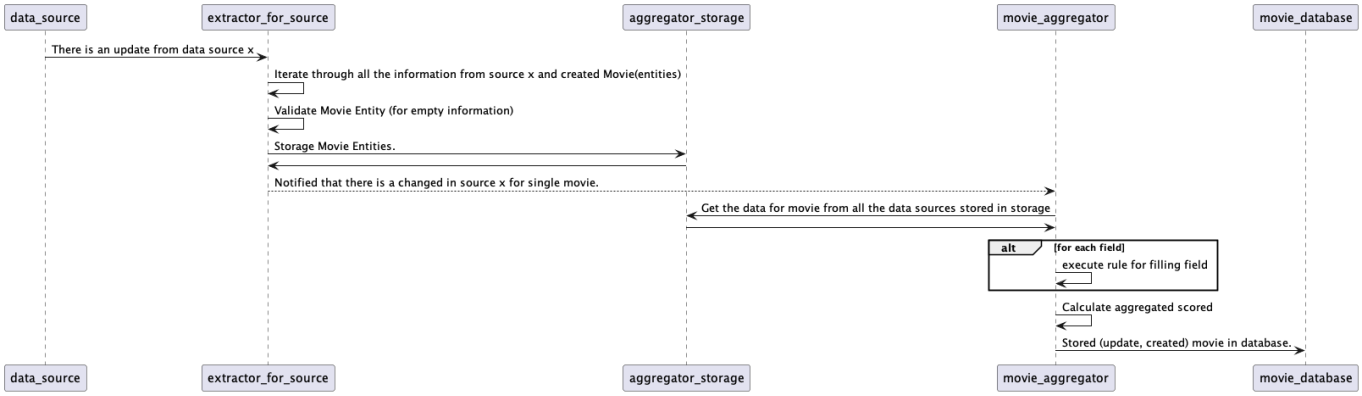
The aggregator algorithm contains all the rules that are define for each data source and each field to populate a movie entity and stored in db.




```
    def calculate_movie_agg(imdb_movie, rt_movies ...)
        # Calculate new movie from all data sources
        return MovieC(
            title=get_title(imdb_movie, rt_movies..),
            ...
        )
```

Sequence of an Update

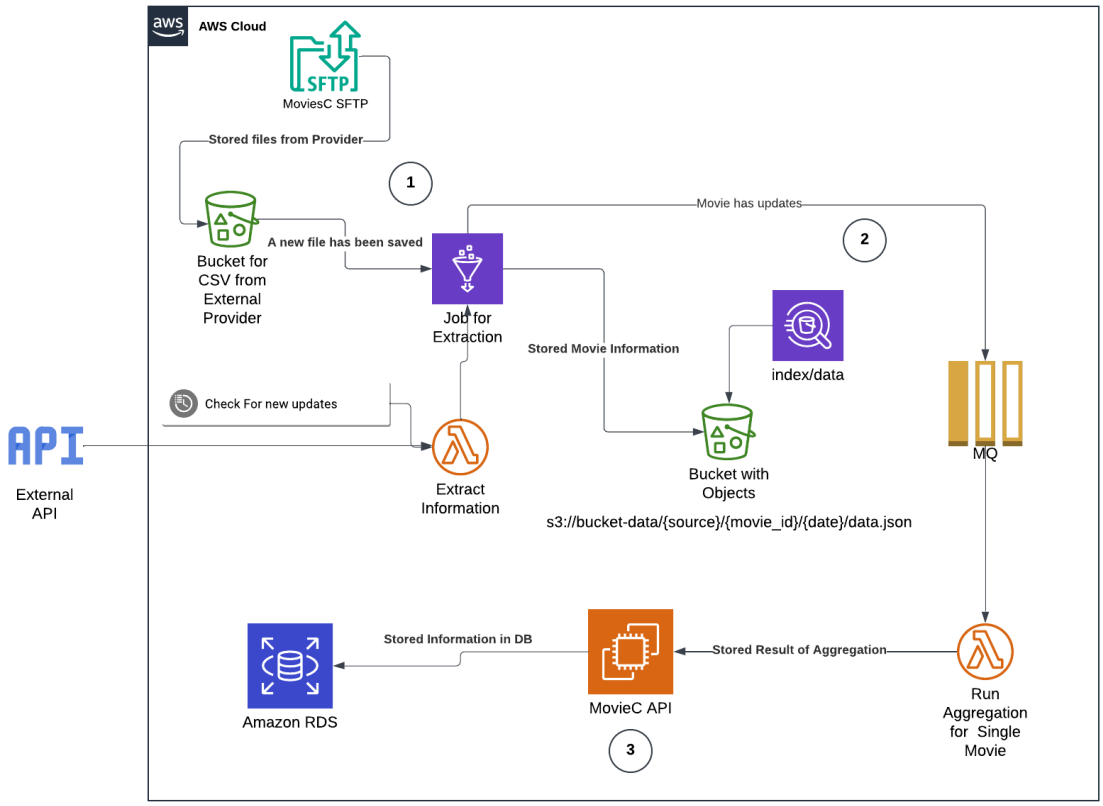
Here we can see how an update of a source goes through all the systems:



Notes in Implementation

The system can be implemented using airflow or lambda functions as a main engine for running extraction But for running the aggregation is suggested to used a message queue that ensure the order of the updates. This allow to be a more robust system where we can try and re-try operations without putting in risk consistency of the data.

The following diagram shows an implementation of the system:



Arch2 (Example of architecture)

1. If the data source is an API we to define how to get the updates we can get by getting and endpoint that allow us to see what movies has new updates. Then we need to define an scheduler for checking new update in this endpoint.
2. Each update is registered as event in SQS message queue where another lambda is listen to new messages.
3. The lambda tha runs the aggregation call the moviec api to update an specific movie in the system or created a new one.

   Notes: this architecture assume that the files from the providers are big, this could create a bottle neck is there are many updates. But the system could horizontal scale to support the demand (created more instance of the API. etc)