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VIDEO ONDEMAND TRANSCODING IN AMAZON WEB SERVICE USING HETEROGENEOUS CLOUD SERVICES

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Abstract: Video streaming is categorized into two types in the form of on-demand video transcoding and live-streaming, typically the streaming videos are transcoded based on the clients viewing device characteristics. However, the transcoding operation is expensive in case of computation and storage. expensive so, the streaming video service providers at present store numerous versions of same transcoded videos to serve various kinds of client devices for the viewers satisfaction. The foremost challenges in using cloud resources for transcoding videos is to deploy the cloud services without any changes in the quality of service for the streaming videos. To avoid these challenges, in order to present an architecture for video on-demand transcoding for streaming videos. Therefore, by using an amazon web service (AWS) solution architecture for video on-demand transcoding to overcome the challenge particularly Amazon EC2 service for computing and Amazon S3 service for storage. Correspondingly, AWS provides video on demand architecture for amazon workflow and service delivery. This best solution for minimizing the start-up delay, Latency, Transmission delay and throughput as a QOS metrics to evaluate the performance it proposed architecture as Amazon web service solution architecture that finds the way to overcome these challenges.

Simulation results using CloudSim tool is used to shows that, AWS video streaming architecture has improved QoS than the Cloud-based Video Streaming Service Architecture could significantly reduce the QoS violations in video streaming.

Index Terms - Video Splitter, Task scheduler, Transcoding virtual machines (VM), Elasticity Manager, Video merger, Caching policy, AWS Lambda, AWS Elemental Media Convertor and AWS MediaElemetalPackages.

I. INTRODUCTION

In today's world the concept streaming videos plays a major role in increasing current services in both network and computing industries. Many widespread ranges of application are dependent upon the video streaming. One of the best examples are e-learning systems, disaster management, video chat in addition security systems which works based on the video surveillance as well as network-based broadcasting channels, social networks and movie industries. Some of the medium over whereas viewers can receive and watch the video contents that are vividly transformed over previous years from traditional systems like TV to various streaming devices such as laptops, desktops, and smartphones over the networks. There are different architectural features, where the spectators for streaming videos based on the variation of clients devices from large screen TVs and desktops to tablets and smartphones. Many contents of videos are either in the form of Video on Demand (VOD) (e.g., YouTube or Netflix) or live-streaming (e.g., Livestream), that are requested to be transformed (i.e., transcoded or converted) depending on the features of the client's devices (e.g., bit rate adjustment, frame resolution, network bandwidth and frame rates). By making the videos that are streaming readily accessible for the listeners, video streaming workers commonly performing the transcoding operations in offline manners. To store and transcode (i.e., pre-transcode) the numerous set-ups of the similar videos to satisfy the necessities of viewers with varied displaying devices. The video streaming providers such as Netflix that are to be pre-transcoded above 50 formats for a single video and store in their repositories. To avoid the computation and storage request of video transcoding, a video streaming provider widely use cloud computing services. Whereas pre-transcoding of videos that enforces a substantial higher cost to the service providers.

The proposed solution is to transcode the streaming videos either in an on-demand method using computing services that are accessible by the cloud service providers. The main challenge is to deploy the cloud services in a cost-effective way and without a foremost effect on the QoS demands of streaming videos. The video stream clients all have a unique QoS difficulties. There is an essential to receive a video that streams without slight interruption. Such interruption may happen either throughout streaming, outstanding to an inadequate transcoding task, or it may occur at a start of a video that streams. In this it concentrates more about the prior delay that is lost presentation deadline and also the startup delay for a streaming video. Though, one can rank the excellence of the service by the video streaming providers created on the video's start- up delay. Consequently, to capitalize on the client's fulfilment here legally describing the video streaming based on QoS request as: by minimalizing the start-up suspension without losing the performance goal. Video Streaming service provider's focusing area is to occupy the minutest for cloud properties, already it encounters the QoS necessities of video streaming. Sustaining this area, it develops additional difficulties by considering the dissimilarities happen in the ondemand degree of videos that streams in diverse category of facilities accessible by cloud workers (heterogeneous cloud). To lessen the cost of exploiting cloud properties, founded on the client's demand in amount with admiration to the video streaming videos that rest on the QoS necessities.

In preceding works, the transcoding method that are used for cloud-based video transcoding is video on-demand (VOD). Nevertheless, the concentration is mostly on the usage of resourcefully the cloud properties for off (not on-demand) transcoding. As per for live streaming of videos, its concentration is on in what way to transmission for live streaming contented, although live streaming transcoding has continued to be undamaged.

This is obviously dissimilar from Content Delivery Networks (CDN) wherever maximum amount of the data (video contents) were spread in several physical ranges only for fast access. Actually, online transcoding scheme can be completed CDN's by modifying the video set-ups founded on the features of viewer's devices. To overawed the computational and storage request of video transcoding, the video streaming providers will widely use cloud computing facilities. To reduce the cost of videos the method pre-- transcoding container execute a noteworthy for video streaming service providers. The main aim is to overcome the QoS metrics such as startup delay, latency, throughput and transmission delay without affecting the quality of the video contents in heterogeneous cloud service.

II CVSS: CLOUD-BASED VIDEO STREAMING SERVICE ARCHITECTURE

The cloud-based video streaming service architecture main objectives is to deal with a request received for video streaming formats which is not available in the repositories. An outline of this model displays the sequence of activities occupied the place to transcode the streaming videos in an on-demand manner. The CVS2 architecture includes eight main components, namely Video Splitter, Admission Control, Time Estimator, Task (i.e., GOP) Scheduler, Heterogeneous Transcoding VMs, VM Provisioner, Video Merger, and Caching.

Video Splitter The main role of video splitter is to splits the streaming videos in some GOPs that can be transcoded independently. To each GOP is treated by way of tasks with an specific deadline. The limit for each GOP is the presentation time for the first frame in that particular GOP. In the instance of video On-demand, if a little of the GOP failures to present its deadline, also it motionlessly had to finish its transcoding tasks.

Admission Control In admission control the elements contains the rules which regulate each GOPs forwarding to the scheduling queue. In reality, the video splitter will produce GOP for all the streaming videos that are to be demanded. The policies of admission control will limit according to the importance of the GOPs as well as it dispatched consequently to the scheduling queue. The policies of admission control works depending upon the receivers input it receives from the video splitter and merger. The priority given by the admission control for each GOPs is depending upon the sequence number of each GOP in a streaming video.

Transcoding virtual machines (VMs) The virtual machines were allocated from various cloud service providers to transcode the GOPs tasks. Therefore, the cloud service providers can suggest various VMs with a miscellaneous architectural configuration. Though each GOP might process all VM types whereas the implementation period can differ.

Execution Time Estimator The main goal of the time estimator module is to evaluate the execution time of each GOP tasks. Therefore, the evaluation of the execution time supports both the VM provisioning and scheduling mechanisms to function efficiently. In a video on-demand video streaming, typically the video streams for many times.

Transcoding (GOP) Task Scheduler The GOP task scheduler (briefly called transcoding scheduler) is responsible for mapping GOPs to a set of heterogeneous VMs. Considering the heterogeneity in VMs with the minimum incurred cost while satisfying theQoS demands of the viewers. GOPs of different video streams are interleaved within the scheduling queue.

VM Provisioner The VM Provisioner component monitors the operation of transcoding VMs in the CVS2 architecture and dynamically reconfigures the VM cluster with two goals: (A) minimizing the incurred cost of the stream provider; (B) maintaining a robust QoS for viewers.

Video Merger GOPs are transcoded on different VMs independently. Later the GOPs in a video stream may be completed before the video that stream. The role of video merger is to rebuild the sequence of GOPs in a right order. To build the transcode streaming the video merger that maintains an output window for each video streaming. Video Merger is in contact with the Admission Controller component.

Caching To avoid the redundant transcoding of trending videos, the CVSS architecture provides a caching policy to decide whether a transcoded video should be stored or not in the repositories. If the video is barely requested by the viewers, there is no need to store (i.e., cache) the different transcoded version.

III Working of AWS Video Streaming Model

In an AWS the Video on demand will repeatedly supplies the service for AWS that is essential to shape a distributed and scalable workflow for video-on-demand. This resolution of video-on-demand which consumes metadata files as well as the original videos, procedures the playback videos with a widespread variety of user devices, that will store the broadcasting files which are to be transcoded also sends the playback videos to the end-users over the amazon CloudFront. The AWS provides administrations for slightly the size to the capacity which results in the scalability and also flexibility to process the videos with extremely scattered and modified to access the videos. Here the requirement for on-demand otherwise live video context, spread to influence the investors as well as widen the influence with solution for the videos that can permit to extensive variety of company that streaming the videos based on the application.

This workflow will create buckets and an API to manage the VOD content with AWS. AWS solution architecture provided a method to implement which can ingest and process the original playback videos on a extensive variety of client devices. Though, the transcoded media files were stored based on video on-demand distribution to the end-users over amazon CloudFront. This architecture can deploy using solution implementation guide and AWS CloudFormation template.

The AWS solution architecture utilizes AWS Lambda function which triggers the AWS step functions used for ingest as well as processing, and finally publishing the workflow. The step function of the workflow will consume a original format of the video and the metadata files which will authenticates the original files, also produces metadata for the source of the original video files. Again, next the workflow of the step functions for an encoding profile-based metadata is generated to acquiesces the encoding jobs to an AWS

ElementalMediaConvert. Subsequently it encodes the source video, finally the third step fuctions workflow is used to authenticates the output file. An input bucket is created and used to store raw video content. Once a file is uploaded in this bucket, a Lambda function will be triggered to create a MediaConvert job to transcode the video. The transcoded video will be stored into an output bucket. API Gateway will let to make API requests to get the list of transcoded videos available in the output bucket.

Features

- API to perform CRUD operations on the content
- S3 tagging
- Cognito integration
- Metadata stored in DynamoDB
- Easy configuration
- Easy install - one command to deploy the full stack and the s3 triggers
- m3u8 support

To address the forward and backward security problem while sharing the data, a simple and efficient Logical Key Hierarchy technique is used. Here, as soon as a associate join in the cluster otherwise leaves the cluster the cluster key must be changed. As soon as a associate joins a cluster, the novel client cannot acquire the preceding cluster key, which is called as backward security. On the previous hand when a client leaves a cluster he can economically compute the novel key, once a leaving client cannot acquire a cluster key is called as forward security. Not only satisfy the security restriction, it also minimizes the computation charge along with storage price of the rekeying process.

IV Conclusion

The proposed AWS streaming architecture for an video on-demand transcoding is developed to aware the viewers quality of service demands and aim to maintain quality of service though minimalizing the experienced cost to the streaming service protocols. These mechanisms takes benefit over the heterogeneous VM's, obtainable by the cloud service providers with varied in costs. The scheduler mechanism will lessen the start-up delay besides the deadline for QoS violations of the streaming services. The AWS architecture is used for service stream providers to exploit the cloud service that offers video on-demand transcoding for streaming services. The AWS architecture is effectively used to minimize the startup delay, transmission delay, latency and buffering time. The proposed AWS architecture for video on-demand transcoding practices cloud properties in heterogeneous VMs. Experiment results show that, proposed architecture technique offers lesser QoS violation rates. Furthermore, the dynamic resource provisioning policy benefits video streaming service providers which meaningfully decreases the cost of utilizing the cloud resources. Towards the end of this work, it proposes and develops an architecture for on-demand transcoding video by means of cloud services. The main aim of this task is to lessening the QoS violations of streaming videos also minimalize the experienced cost of utilizing cloud resources for streaming providers. The future architecture might be mainly beneficial for a small and medium sized streaming videos that offers to use cloud resources as their structure, and recover the client's fulfilment.

Future Work

- **Transcoding time estimation**: The stream processing time estimation is very important and finding a good approach for such estimation possibly through comparison of different existing concepts would enable the system to become more secure in terms of quality of service and resource management.
- **Modelling and simulation languages/frameworks:** System modelling and simulation plays major role in development of good systems (frame works). Some distributed system modelling tools are already exist especially for the classical distributed systems that do not deal with streams.

- **Optimization:** Distributed processing system optimizations must be done for many parameters such as economic cost or quality of services. Different algorithms are based on existing concepts from various fields could be developed.

- **Functional parallelism:** To exploit the data parallelism, it is also possible to map the different functions that makes up a transcoder among several processors. This fact could be enable us to utilize an extra specific hardware that are found alongside in the main CPU.

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