

How does Cloud support OTT Platforms in delivering content seamlessly?

19CSE447 – CLOUD COMPUTING

Case Study Report

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1. Introduction

As video streaming business grows in popularity, businesses are looking for the most reliable, secure, and scalable cloud video streaming. With a professional video hosting infrastructure, brands can now focus on delivering great video content without worrying about technical issues in the meantime.

As you know, due to this current COVID scenario, people around the world are consuming more content than ever before. As a result, more businesses are adopting and expanding cloud video every day. There is a reason for this. Thousands of records need to be stored in one place, and the need for the Internet creates a single physical infrastructure everywhere. The video cloud is here, saving you a lot of money on the equipment we need and offering the ultimate in convenience for the end-users.

2. What is Cloud Video Streaming?

Simply put, we can say that streaming occurs when we tend to deliver data to internet-enabled devices and play that data in real time. Internet-enabled devices include smartphones, computers, and laptops. These use cloud servers where the videos are delivered over the internet and can be accessed anytime, anywhere at your own pace. For this, we use cloud video players.

Netflix, Amazon Prime, Hotstar, Eros Now, Zee5, Voot, YuppTV, Hulu, Dacast are some of the famous OTT platforms.

2.1. Working

Cloud-based streaming software relies on a network of cloud servers that are dedicated to hosting video files and efficiently delivering this content to viewers.

Once broadcasters upload files to these cloud streaming servers, they're encoded and transcoded into a variety of formats that are ready for playback.

Cloud video streams are efficiently created after an integral process i.e., video transcoding in multiple renditions. A single video file without taking any resources away from initial process of encoding ensure that the video quality is not compromised at any point of time. That way broadcasters ensure that their content is shareable with any kind of device their audiences use.

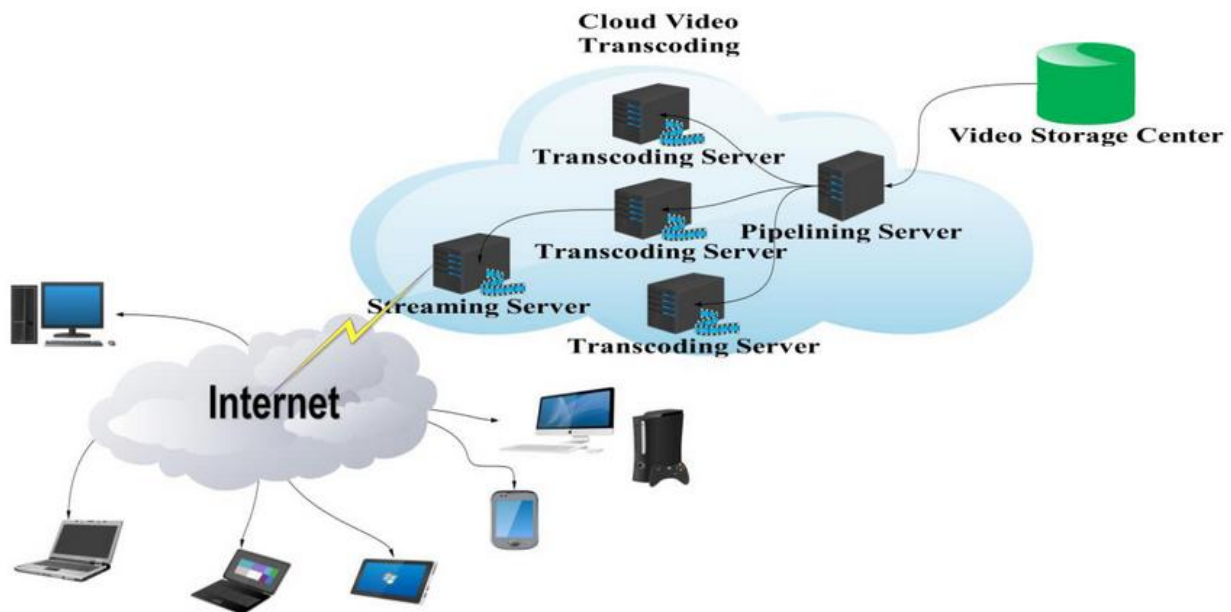


Fig. 1. Generic architecture of cloud-based media streaming.

With cloud-based video streaming, content owners like you can quickly host their content, along with storage facility in order to stream on-demand or live events to their viewers, as per their consumption demands.

3. Cloud Transcoding

Cloud-based streaming software relies on a network of cloud servers that are dedicated to hosting video files and efficiently delivering this content to viewers.

Cloud transcoding is the process of converting a video file into additional formats entirely in the cloud. More specifically, transcoding means creating new files in different sizes, resolutions, and bitrates from a single encoded video file. This approach allows broadcasters and streamers to ensure compatibility for audiences that view video content from numerous devices and with varying network conditions.

While video compatibility is crucial, the most common use case for cloud transcoding is Adaptive Bitrate Streaming (ABS). Many streamers offer multi-bitrate streaming by providing viewers several different bitrates to choose from, but ABS takes this a step further by adjusting the bitrate in real-time based on the viewer's Internet bandwidth and the processing power of their device.

When it comes to live streaming, transcoding is also critical. During live broadcasts, the stream is often encoded using the RTMP protocol. The problem is that RTMP is only compatible with Flash Player out-of-the-box, which isn't supported by newer web browsers.

Cloud transcoding doesn't require additional bandwidth at the broadcasting site, which can be critical for live streaming. The cloud-based approach is also more scalable because the transcoder can quickly increase its available resources to handle more videos when necessary.

4. Cloud based Workflow for Video Streaming



Fig 3: A cloud based work-flow for providing a quality streaming experience to end consumers

This functional work-flow is aided by infrastructure components which includes:

- a) Content Management System (CMS)
- b) Failover and Redundancy management hardware

The video uploaded to the cloud is usually of one format and specification. In order for the video to be played across various different mobiles, tablets, desktops, and smart-TV's the video has to be converted in different formats and specifications. This process of video conversion called as "encoding" and is the most computationally intensive. While encoding a given video, the following has to be considered:

- a) The original format of the video
- b) Any encoding applied to the original video
- c) The desired format and specifications for the output video.

Even before media streaming became mainstream CDN's have long been used for speeding up the delivery of content to end consumers. CDN's with their vast network of servers spread across several locations and geographies provide web-acceleration by serving the consumer with a cached version of the resource requested. For accelerated delivery of video content 2 distinct categories of CDN's are of key importance. These 2 types are:

- a) **On Demand Video CDN:** These are similar to the general purpose CDN's. The underlying principle is that video content is no different from serving a large file or application.

b) **Live Video CDN:** Though majority of the CDN's are on demand video CDN's, live video CDN's are particularly useful for optimising the delivery of live video content by ensuring lower latency, lower packet loss and high availability.

5. Real Life Scenario

To understand the cloud video streaming, let us consider **Disney+ Hotstar** as an example and analyse how they manage to deliver content seamlessly for huge number of users.

Hotstar, (now Disney+ Hotstar), is the most subscribed-to OTT platform in India, owned by Star India as of July 2020, with around 300 million active users and over 350 million downloads.

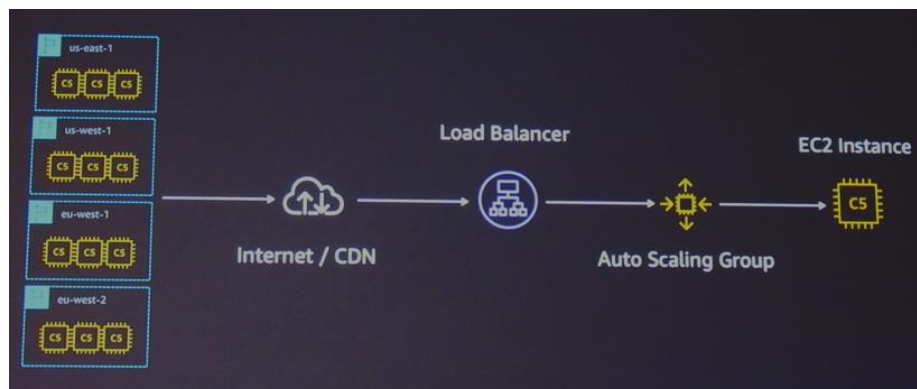
5.1. Hotstar with 25M users

During the India vs New Zealand cricket match in 2019, Hotstar faced the challenge of handling **25.3 M** concurrent users in live streaming. **13.9 M** is the first peak before it started raining, and the game was postponed to the next day. On the next day, the number of users reached to the peak of 25.3 M. They received around 1M+ peak requests per second. The bandwidth consumption was more than 10TB per second. This is more than the previous peak of **18.6 M** occurred during IPL 2019 Final.



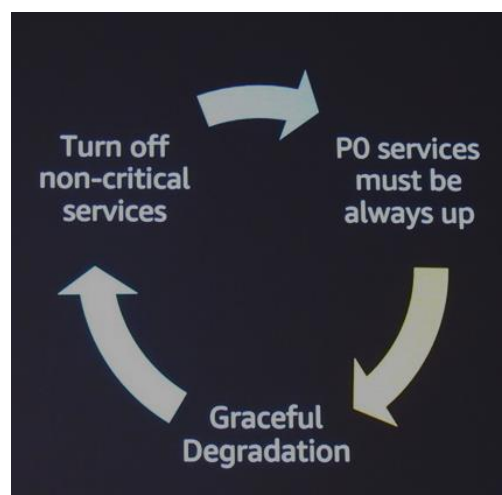
During that time Hotstar was using **AWS (Amazon Web Services)** as their cloud provider. Hotstar followed a new strategy called **Project HULK**. It involved Load generation, Performance and Tsunami tests. The traffic pattern is predicted using ML Algorithms and tested accordingly. 108000 CPU, 216 GB, 200GBps network out were

involved in testing. By utilizing the power of cloud, they have distributed the system across **8 geographical locations** to handle the load. It is in a public cloud; network is shared among all the customer.



Auto-scaling was not used since it might lead to insufficient capacity errors.

Battle tested scaling strategy is used by Hotstar. It scales up based on request count or platform concurrency. They are also prepared for the worst-case mode. While the game is going on, they don't have 15 or 20 minutes to fix the problem, so turning off recommendations or personalization to keep critical components running; streaming video aggregation or a payment subscription.



6. Future of OTT

As we know there are multitude of cloud based streaming for content businesses to choose & leverage with its newly-packed features, you can quickly take a glance of them individually. Ultimately, broadcasters, content providers or professional streamers like need to determine their business hosting needs & weigh several options accordingly

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