

Analysis of Design, Implementation Challenges on Video on Demand Platform

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Abstract – Today’s we are widely used videos for learning and entertainment purposes. In entertainment and learning websites are nowadays using video on demand platform for serving the user.

Video Platform has made huge traffic on the internet year by year. And we need also the Quality of service. In this below, we saw how to design and implement a video-on-demand video distribution platform with quality of service using a combination of cloud computing and network techniques with security

Key Words: Video on Demand, VOD, QoS, HLS

1. INTRODUCTION

In Video on Demand Platform mostly used entertainment and education industries. Everyone knows the video conveys the information very effectively. And any type’s people easily understand the information comparatively other Media like text and audio

Many websites used for these techniques to convey information and various purpose in various industries. In education platforms using learning purposes and television industries used entertainment purposes. Example course era, udemy, and other websites used a learning purpose. YouTube, SonyLiv Hot Star is used for entertainment purposes.

1.1 PROPOSED SYSTEM ON VIDEO ON DEMAND

In video streaming and copy write protection is growing in a few years. In few years before the flash-based player is used for playing video after an HTML Video tag introduced for playing the video after MPG-CNEC formatted videos are introduced for protected video using Video Streaming.

Now a day using Adaptive Bitrate Streaming and DRM Protected content. In this streaming using technologies, there are HLS, DASH, Smooth Streaming, and others.

Below we saw how to implement Video on Demand Platform. And give Quality of service to the end-user.

1.2 VIDEO ON DEMAND AND TYPES

Video-on-demand (VOD) is a video media distribution system that allows users to access video entertainment without a traditional video entertainment device and the constraints.

In this used for Hypertext Transmission Control Protocol. Nowadays all devices have supported these protocols [example: mobiles, laptops, and smart-TV. so everyone easily uses this service. The usage and implementation based VOD have three types there are.

TVOD [Transactional VOD]

SVOD [Subscription VOD]

AVOD [Ad –Supported VOD]

[1]

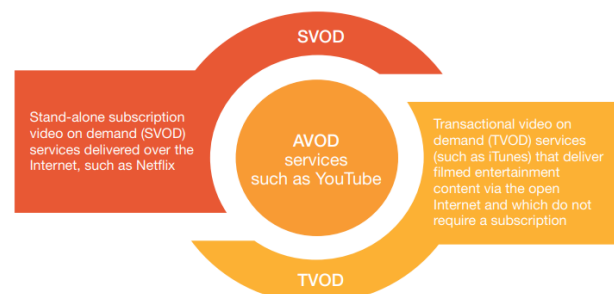


Figure (i)

In the above image explain the difference between the above three types of VOD.

2. IMPLEMENTATION PROCEDURE :-

The video-on-demand platform implementation required the Quality video files and the file is processed and transformed into the Adaptive multi-bitrate HLS or Dash Streams using AES Encryption using a unique key.

The video is stored in the physical location of the server. The Video on Demand Platform has handled the Video processing into the ABS (Adaptive Bit-rate Streaming) format.

The transformed trans coded files have contains the many file types if example HLS Transformed file

contains the master playlist and video resolution based on multiple playlist files and fragmented mp4 files.

The playlist files contain the list of fragmented file and verification URL. The Play List file is used for playing the video. The master playlist file is to select the video resolutions using bandwidth and network quality.

The selected file mux and demux the files play into the client environment. The network quality changes then automatically changed the video quality and select the other variant file.

In our Previous paper is to explain the HLS implementation procedure's [8]

The Recommended resolution & aspect ratios as per youtube guidelines for the default 16:9 aspect ratio encode at these resolutions:[3]

- **2160p:** 3840x2160
- **1440p:** 2560x1440
- **1080p:** 1920x1080
- **720p:** 1280x720
- **480p:** 854x480
- **360p:** 640x360
- **240p:** 426x240



Figure (ii)

The Video server Send the video in various resolution in the same URL based on network capacity and bandwidth based. And user selected resolution. If the PC have good network connectivity then send 1080p in between the network bandwidth quality has reduced then it's automatically changes the video quality for the user experience and network capacity. Otherwise user can also change video resolution that changed resolution based server send the response and played in the client machine.

The HLS or DASH Protocol's are automatically changed the video resolution based on the network capacity.

The sever configuration required some mime type configurations. If ex we implement the HLS and hosted in IIS then we add mime types for m3u8 and ts refer figure(iii)

File Extension	MIME Type
.M3U8	application/x-mpegURL or vnd.apple.mpegURL
.ts	video/MP2T

Figure (iii)

3. CONTENT CLASSIFICATIONS:

Content Classification is important to Analyze and organizing the video content based on the content category. The Classification is very important for identity and search and find a particular category or file for indexing and quickly find that.

Content Classification provides context-sensitive analysis and automation features to organize unstructured content. It's used for classification decisions. It can organize information by policies or keywords, and it can assign meta data that is based on.

If example the video wildlife video and it contains the tiger and deer then it's classified tags like wildlife, tiger, deer-like. That is very helpful to find which category based video. If learning video means it classified language and concepts based. Ex C#, Java, Science, MVC Framework, Web, UI Framework, Angular, Node like.

It's used for

1. Fast access to meaningful content
2. Filters out irrelevant content
3. Natural language processing
4. Information governance
5. Content clustering and search

4. IMPLEMENTATION CHALLENGES

In this VOD. Dominating major industries are business (advertisement, marketing, entertainment, learning, and other industries.) In these fields. The practical difficulties for implementing video on demand are[10]

1. Large file storage
2. Efficient streaming

3. Bandwidth issues
4. Content Acquisition
5. Playback challenge
6. Security of the media files
7. Latency and Reliability Issues
8. Device Compatibility Challenges
9. Payment gateway if required SVOD and TVOD Model
10. Video Processing server capacity
11. Development cost and deployment cost
12. Subscription management
13. Video Cryptography key management
14. Admin panel manage entire VOD services and User and Role management based on the industries

TECHNOLOGY CHALLENGES:

1. Identity server management and SSO
2. Authentication and authorization
3. DDOS production
4. Distributed content delivery without downtime
5. Security Updates and Migrations
6. Media Processing and Hardware
7. Video Player Integration and Codec Support

In the above challenges to be faced for creating a VOD Platform or solutions.

5. RELATED WORK

In my Analyze its required mp4 video to Adaptive bit-rate streaming conversions. And storage capacity. In data distribution using CDN for quality of services to engage the web site.

Below we saw about the content delivery network and its usage. And Cloud networking configuration. In my previous paper is to explain the security in the login and HLS Process. In this paper, we saw configuration and security-related information.

The Enterprise Video on Demand Own Video Platform has required for some specific Quality. For branding, Analytics, and future business Enhancement and user customer or user engagement. That only improves that enterprise video on demand business.

In My Analysis, it's have required some parameters there are.



Figure (vi)

Assert taken from deloitte.com [2]

1. User Identity for Analytics and security
2. Password Protection for user security
3. Web Token for client-server authentication
4. AES Encryption for Digital Asset Protection
5. Water Marking in Video for Branding
6. Sever side Security for hackers & pirates can break into your server.
7. Geographic and domain Restrictions for content available zones.
8. Payment Security for customer security
9. End-User Access management for a subscription.
10. Marketing Channel and advertisement platform and payment gateway and payment partners for growing the business

Figure (ii) explains the Video on the demand ecosystem.

The Client-Server model used for small enterprises. If the large enterprises using CDN Technology for global availability

Content Delivery Networks:

In the above challenges to be considered before implementing the VOD Service for the industries. The Major concern is the good availability of the content wide range of the Network.

So, nowadays using CDN technology for distributing the content and protect using https certificates authorization, cryptographic techniques, user identity, and other security mechanisms is used for protecting the original content from the hackers. And piracy protection based on IT laws.

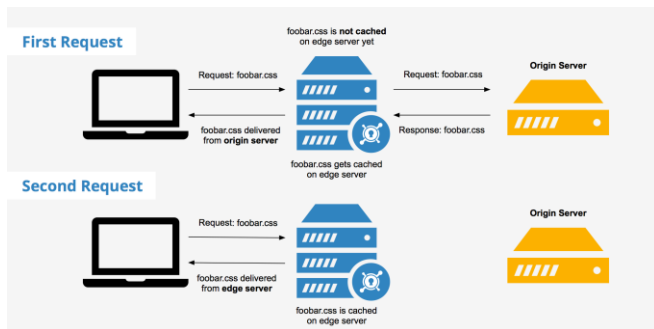


Figure (v)

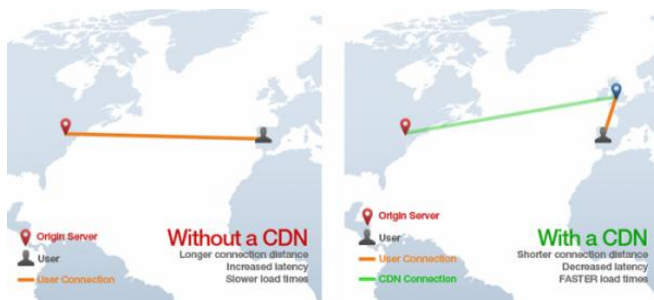


Figure (vi)

Figure(vi) explains how to content cached and delivery from another request without depending on the node. In the CDN network sync all the data of each node of the computer if the region-specific they distribute the content using distributed and peer to peer and other techniques.

Figure (vi) explains the with CDN and without CDN how to deliver the video to the users. If without CDN the client receives the digital content directly from the server. In case if hosting using CDN technology then it's received from the nearest distributed location. In this CDN content copied and globally synced the main server to other server nodes. So, the content availability is higher and the user has got the Quality of Service.

The Quality of Service helps to the growth of video on demand platform and user engagement and it's the related business of the content provider. It's maintain

6. Bandwidth Calculations :

The video-on-demand platform implementation has depended on bandwidth and storage. The bandwidth and storage have a considerable number of variables. In below we saw bandwidth calculation

Bandwidth [10]

Streaming is calculated in kilobits per second (kbps). Do not mistake kilobits for kilobytes they are different! To convert kilobits per second to kilobytes per second you must divide your stream by 8. There are 1024 kilobytes in a megabyte and 1024 megabytes in a gigabyte. How do I calculate bandwidth and gigabyte consumption

1. (divide X 8) - First you must convert (divide) your desired stream rate [kilobits per second] by the number 8 [kilobit to kilobyte conversion factor] to get the number of kilobytes per second.
2. (X 60) - multiply your answer by 60 [seconds] to get the kilobytes per minute.
3. (X 60) - Multiply this answer by 60 [minutes] to get kilobytes per hour.
4. (divide X 1024) - You then take your kilobytes per hour and divide by 1024 [kilobyte to megabyte conversion rate] to calculate megabytes per hour.
5. Once you have calculated the megabytes per hour [mb/hour],

you can then take this information and calculate bandwidth consumption based on the specific data from your demographic research.

Audio Scenario example: You intend to stream at 20kbps and want to calculate how many listening hours one gigabyte would provide.

Video Formula:

part a : $300\text{kbps} / 8 \text{ conversion factor} \times 60 \text{ seconds} \times 60 \text{ minutes} / 1000 \text{ kb} = \text{mb/hour}$

part b : $\text{mb/hour consumed} \times \text{users} \times \text{hours/day} \times \text{days} / 1000 \text{ megabytes} = \text{total GB's of bandwidth consumed}$

Video scenario calculation:

part a : $(300 / 8 = 37.5) (37.5 \times 60 = 2250) (2250 \times 60 = 135000) (135000 / 1000 = 135 \text{ mb/hour})$

part b : $(135 \times 50 = 6750) (6750 \times 1 = 6750) (6750 \times 30 = 202500) (202500 / 1000 = 202.5)$

Answer: Video streamed at 300kbps watched by 50 clients for one hour each day, for an entire month would equal 202.5GB's of bandwidth.

7. CONCLUSIONS

In this paper we saw what are required video on demand platform implementation. And bandwidth calculation content delivery network usage in video on demand platform.

In the Video on Demand Platform has growing and it given huge network traffic in this paper we saw the

resolution and ratio recommendation. Bandwidth calculation basic of CDN Work and VOD implementation challenge.

8. REFERENCES

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