Bhartiya Vidya Bhavan's

Sardar Patel Institute of Technology

(Autonomous Institute Affiliated to University of Mumbai)

[Knowledge is Nectar]

Department of Computer Engineering

ISE – 2 (Open Book) **Max Marks:10**

Class: TE COMP Semester:V
Course Name: System Analysis & Design Course Code: CE52
Date: 28-Oct-2020 Academic Year: 2020-21

Note: Upload assignment with name and UID written on top right corner. Draw diagrams using scale.
Create 2 documents, one for question 1 and second for question 2 .
Upload question 1 and 2 separately on moodle under topic ISE2 Exam.

Name: Vishal Shashikant Salvi
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SE COMPS
BATCH C
52

Q 1) How does YouTube architecture support large amount of videos without running out of storage space? How does YouTube architecture serve high-quality videos with low latency? Explain with help of architecture diagram. (Answer should not exceed 2 pages)

5Marks

Answer:

On Next Page

Name: Vishal Shashikant Salvi 52

2019230069 SAD-ISE 2 Batch-C

Q.1)

You tube architecture support large amount of videos without running out of storage space-

1) Beacause of the videos which are available on youtube that are stored in the hard drives in warehouse-scale Google datacenters. The data which is upload on youtube that managed by the Google File System as well as big table

2) Google File System is a distributed File System developed by google to manage large scale data in a distributed environment.

3) Where as big table is a low latency distributed data storage system which is built on google File System to deal with petabyte-scale data Spread over thousands of machines.

4) So, the videos that are stored in the hard drives. Youtube is owned by google. The website and the video's are stored in datacenters from google.

- Google has datacenters all over the world meaning that the website youtube is not just stored on one location.

- when you upload a video to youtube, it is usually stored in the datacenter that serves yours region.

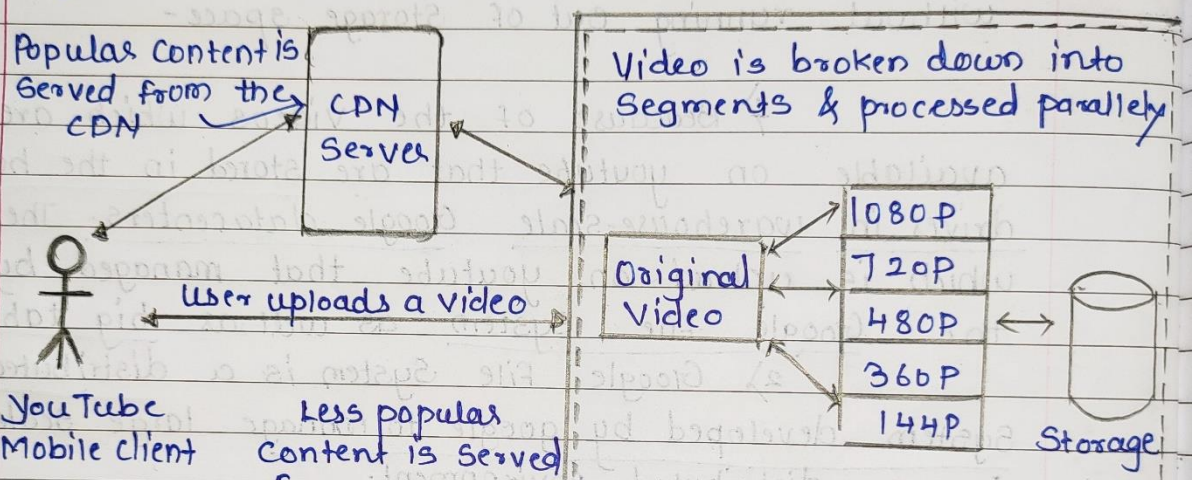
- Further the video you uploaded will be duplicated on datacenters in regions where is a high demand for the video.

Vishal Salvi 2019230069

Date / /

Finally, youtube might backup Videos from one region to another to make sure the data is not lost when a datacenter is damaged by for example a natural disaster.

- youtube Architecture



So, Given diagram is youtube Architecture -

The key element in the process of storage and delivery of high Quality Videos on youtube is video transcoding.

Video transcoding is a technique of converting a video into multiple different formats and resolutions to make it playable across

different devices as well as bandwidth

This technique also known as Video encoding. This enables youTube to Stream Videos in different resolutions such as 144p, 240p, 360p, 480p. 720p, 1080p & 4K.

- youtube Serve high quality videos with low latency

1) Just take a example, a live Football match via OTT and hearing yours neighbours, who's watching the same game through traditional broadcast, cheering up to 60 Seconds before you know. the reason is latency and it's an issue that anyone who's Serving video via the interent as youtube is having to face up to.

2) Delivery of content based on the network bandwidth and the device type of the end-user is known as adaptive Streaming.

Imagine Streaming a 4K video at only its original resolution, providing no longer resolution without adaptive Streaming, there is no way viewers with low bandwidth network can watch that 4K Stream.

3) Each video hosted by a mini clustes. Each video is Served by more than one machine.

- More disk Serving content which means more speed & Quality.

4) Keep a simple network path. Not too many devices between content and uses.