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A Novel and Optimal approach for Multimedia Cloud Storage and Delivery to reduce Total Cost of Ownership

Sreelakshmi Gollapudi[1,*], Kartikeshwar Rath[1], Tushar Vrind[1], Deepak TY[1] and Prasad R Rao[1]

[1]Samsung Semiconductors India R&D Centre, Samsung Electronics, Bangalore, India

Abstract

In this era of digital communication, and explosion of social media, users generate and share a lot of information most of which is audio visual content. This kind of multimedia content requires good amount of storage in the local device space as well at the network space. In the available parlance of multimedia cloud storage, when the content is streamed from the content server, the bit-stream is typically adapted depending on the available network bandwidth between the client and server session, for example by using Scalable Video Coding (SVC) technique. However, in case when the content is downloaded at the client for offline viewing, with say a resolution 'Low-Res-1', the multimedia clouds, do not offer additional mechanism to upgrade to a new resolution say 'High-Res-2', without downloading a new file version all over again. In this paper, we propose "MediaStratify" as a novel and optimal approach built on top of SVC to give a scalable solution for storing, sharing and upgrading the multimedia content for viewing offline. Based on the proposal, multimedia content will be stored as layers or 'stratified' and distributed over the cloud infrastructure. Through the devised protocol, the end node fetches the partial offsets (spatial, temporal or quality) and upgrades the files through reconstruction. Enterprise applications can utilize the scheme by installing the proposed novel combiner over the file transfer service, the solution can save network bandwidth and power consumption. The most important contribution is to bring down the Total Cost of Ownership (TCO) for any multimedia cloud or data center by reducing storage requirements by 50 ~ 74% over classical methods, yet achieve the goals of media hosting.

Keywords: Scalable Video Coding, Cloud, Data centre, Temporal Scalability, Spatial Scalability.

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*Corresponding author. Email: s.gollapudi@samsung.com

1. Introduction

There has been explosive growth in the demand of various video-based applications – ranging from video telephony, video sharing, streaming and file sharing etc. 'Always On' mobility is the new normal. The moment a user goes online he goes on creating more content and data by using different application or services. By 2020 we would be creating the content of 44 Zeta Bytes (ZB) across the world – which means every user would be creating Mega Bytes' (MB') of data every second. This demands that we store data at some central location and the availability of it should be high as well as quick.

Usually any connected device end up in being connected to a data center on the cloud – which offers computing powers along with storage and networking support. In order to mitigate the never ending demands of application usage - ranging from handheld devices to smart devices, we need to bring more agility in compute, networking and storage nodes across the data centers.

Cloud technology has played a pivotal role in this as 'Cloud is the new hardware'. It helped in the crucial part for nodes of the data center to be segregated. This gives cloud operators the freedom of implementing any strategy or use case (Infrastructure as Service (IasS) or Platform as Service (PasS) or Software as Service (SasS)) using the same infrastructure – on demand and without doing any physical changes as shown in Figure 1. IaaS provides virtualized computing resources over the internet. PaaS provides