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Web Service for Multimedia Content Streaming Using Adaptive Transmission Control Protocol

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ABSTRACT: Web services allow machines or software to communicate over the network on different platforms in a standardized manner. Along with the development of the Internet, the web services are now widely adopted. Streaming media is multimedia that is constantly received by and presented to an end-user while being delivered by a provider. Now we are moving towards a ubiquitous era of streaming multimedia over the Internet. A survey conducted by StreamMedia.com and the Aberdeen Group indicates that over 74.1\% of business and personal users access streaming media (live video broadcast, Video on Demand (VOD), Web TV, etc) at least 2-3 times per week.The proposed web service will support multimedia content streaming. It is using Adaptive TCP-trunking flow control (ATCP+), which is a segment-based flow control scheme built upon TCP protocol because Transmission Control Protocol (TCP) is sensitive to traffic congestion, and current TCP is insufficient to offer stable and high throughput bandwidth for video transmissions. ATCP+ dynamically adjusts the transmitted segment size and makes multiple TCP connections be trunked together based on network condition, in order to optimize all TCP connection throughputs efficiently.

KEYWORDS: Multimedia streaming, Web service,ATCP,Congestion control, TCP

I.INTRODUCTION

Web services are client and server applications that communicate over the World Wide Web's (WWW) Hyper Text Transfer Protocol (HTTP). As described by the World Wide Web Consortium, web services provide a standard means of interoperating between software applications running on a variety of platforms and frameworks. Web services are characterized by their great interoperability and extensibility, as well as their machine-process able descriptions. Web services can be combined in a loosely coupled way to achieve complex operations. Programs providing simple services can interact with each other to deliver sophisticated added-value services.The concept of streaming media is less than a decade old and yet it has experienced impressive growth. Using streaming technologies, the delivery of audio and video over the Internet now reaches many millions of people using their personal computers – offering live sport, music, news, entertainment and on-demand content. With broadband networks being deployed in many countries and video/audio compression technologies advancing rapidly, the quality of audio and video services over the Internet is increasing rapidly. A variety of user terminals can now be deployed, ranging from office desktops to personal digital assistants (PDAs) and mobile phones.

Video Streaming refers to the real-time transmission of Stored Video. There are two modes for transmission of stored video over the Internet, namely the download mode and the streaming mode. In the download mode, a user downloads the entire video file and then plays back the video file. However, full file transfer in the download mode usually suffers long and perhaps unacceptable transfer time due to the large size of the video files. In contrast, in streaming mode, the video content need not be downloaded in full, but will be played immediately while parts of the content are being received and decoded. Also Streaming refers to the ability of an application to play synchronized media like audio and video in a continuous way while the streaming data are being transmitted to the client over a data network.

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The term multimedia streaming means that there are more than one media type involved in the communication, e.g. text and graphics, voice, animations, video and audio. We define multimedia to denote the property of handling a variety of representation media in an integrated manner. This means that the various sources of media types are integrated into a single system framework. Currently, three incompatible proprietary solutions offered by Real Networks, Microsoft, and Apple dominate the Internet streaming software market.

II. LITERATURE REVIEW

Video streaming is an important component of many Internet multimedia applications, such as distance learning, digital libraries, home shopping and video-on-demand. The best-effort nature of the current Internet poses many challenges to the design of streaming video systems. In this paper [1], Dapeng Wu, Yiwei Thomas Hou, Wenwu Zhu, Ya-Qin Zhang, Jon M. Peha, surveyed major approaches and mechanisms for Internet video streaming. The objective is not to provide an exhaustive review of existing approaches and mechanisms, but instead to give the reader a perspective on the range of options available and the associated trade-offs among performance, functionality, and complexity.

Gibson Lam and David Rossiter [2] stated that the transfer of streaming data is not well supported by current web services standards. So to include multimedia streaming support in the web services domain, they proposed a novel multimedia streaming web services framework for the transfer of streaming multimedia content. First, the framework includes an implementation of a query service for publishing a description of the multimedia content that is input to or output from a multimedia web service. Second, two new MEPs and their SOAP HTTP bindings are created for the exchange of streaming data between two SOAP endpoints.

Yuan-Tse Yu and Sheau-Ru Tong [3] proposed Adaptive TCP-trunking flow control (ATCP+), which is a segment-based flow control scheme built upon TCP protocol. Transmission Control Protocol (TCP) is sensitive to traffic congestion, and current TCP is insufficient to offer stable and high throughput bandwidth for video transmissions. Although many investigations have been proposed to deal with the inefficient problem of TCP protocol, such as Stream Control Transmission Protocol, these mechanisms and protocols are still not well employed by current Internet and used by Hypertext Transfer Protocol (HTTP).

ATCP+ dynamically adjusts the transmitted segment size and makes multiple TCP connections be trunked together based on network condition, in order to optimize all TCP connection throughputs efficiently. ATCP+ presents a cost-effective video streaming solution in real deployment.

The traditional HTTP streaming relies on a series of request segments and receives segments sequentially. In the current Internet media segments can be delivered through distributed networks. In such a scenario, the traditional series request-receive based adaptive HTTP streaming method is, however, unable to provide optimum streaming since the distributed networks resources are not fully utilized.

In this paper [4], Chenghao Liu, ImedBouazizi and MoncefGabbouj presented a novel parallel adaptive HTTP streaming method. Compared to the traditional series of adaptive HTTP streaming technique, this method a) enables the receiver to request multiple segments in parallel, b) provides a solution to maintains a limited number of HTTP sessions for receiving segments in parallel and to determine when to start a new HTTP session to request the next segment, c) can adapt media bitrates while receiving previously requested segments. Simulation results show that the proposed parallel adaptive HTTP streaming method outperforms the traditional series of adaptive HTTP streaming with respect to providing a higher playback media quality and decreasing the interruption frequency of media playing.

As stated in [5] the ubiquitous era of streaming multimedia over the Internet, an increasing number of users are accessing to Internet video services through varieties of terminals, e.g. PC, Set-Top Box IPTV and mobile phones, etc. Whereas extending streaming media to multiple ends adds much to consumer electronic industry, the challenge remains

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on how to provide on-demand services to heterogeneous users with different bandwidth requirement, access manner, QoS demand, etc.

So Zhijia Chen, Chuang Lin (Senior Member, IEEE), Xiaogang Wei, proposed a complete portfolio of solutions for providing multiple Internet video streaming services (live video broadcast, video on demand, video downloading) on 3 Screens (PC, TV, mobile), through a unified Peer-to-Peer (P2P) video platform. Upon manageable P2P framework, different terminals access are supported and end user bandwidth are utilized to scale the system. With our multi-process server management, efficient topology organization, enhanced UDP transmission and intelligent content distribution, our P2P streaming media platform is proved to have lower operation cost and higher user quality.

III. PROPOSED SYSTEM

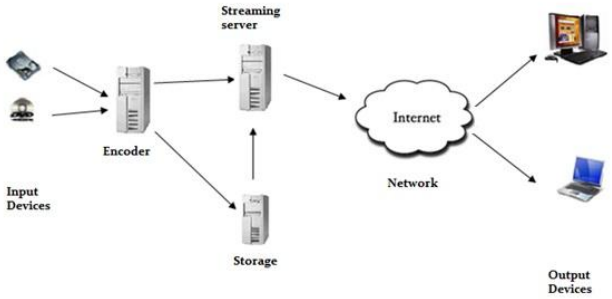

Fig: 1 System Architecture

Proposed system -
The proposed web service will support multimedia content streaming. It is using Adaptive TCP-trunking flow control (ATCP+), which is a segment-based flow control scheme built upon TCP protocol because Transmission Control Protocol (TCP) is sensitive to traffic congestion, and current TCP is insufficient to offer stable and high throughput bandwidth for video transmissions. ATCP+ dynamically adjusts the transmitted segment size and makes multiple TCP connections be trunked together based on network condition, in order to optimize all TCP connection throughputs efficiently.

Create
The media is taken as input source and possibly digitized for further processing. Digitizing means converting analog signal to a digital one.

Content Management
The purpose including create, collect, catalog, organize, store, and access to massive multimedia information database. To develop a system that will not occupy space on the user's hard disk. The user does not get a copy of the media file – that stays on a streaming server. The user can save a media, but what is actually saved is the URL of the stream, the current point in the media's timeline and the user's settings (such as the sound volume level).The proposed system will use the ATCP+ protocol for transmission of the contents. The content will be delivered to users through web service.

Content Delivery
The proposed system will use the ATCP+ protocol for transmission of the contents. The content will be delivered to users through web service.

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IV.IMPLEMANTATION TECHNIQUESAND ALGORITHM

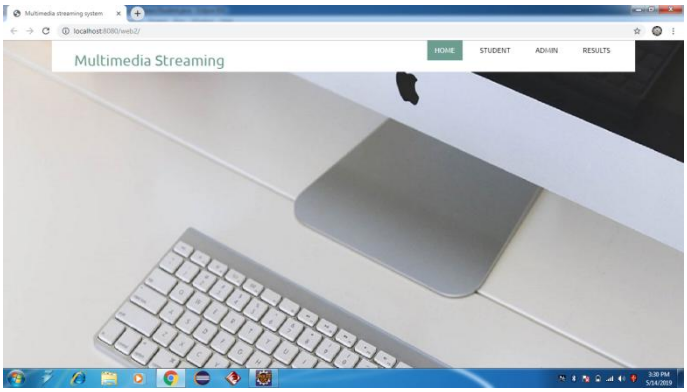
ATCP Algorithm-
Media Segmentation – Media Segmentation is the process of taking the data you hold and dividing it up and grouping similar data together based on the chosen parameters.

Congestion Control – Congestion can be controlled by lot more ways but in proposed system congestion is controlled by few parameter like Sixe of a multimedia, Devices connected in the same network, and the data transmission speed of a network

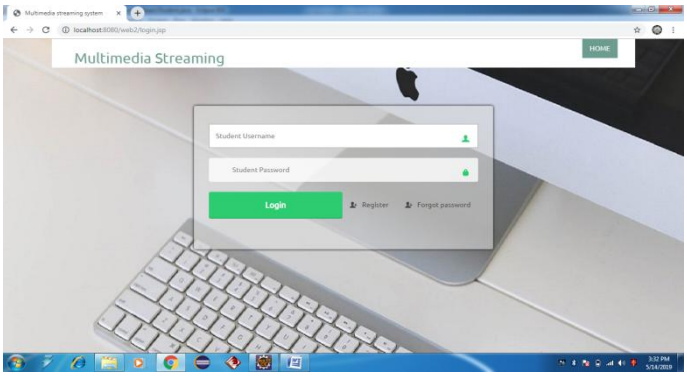
Streaming – provides buffering free streaming to the end user.

V. SREENSHOTS OF THE SYSTEM

Home page



Login Page



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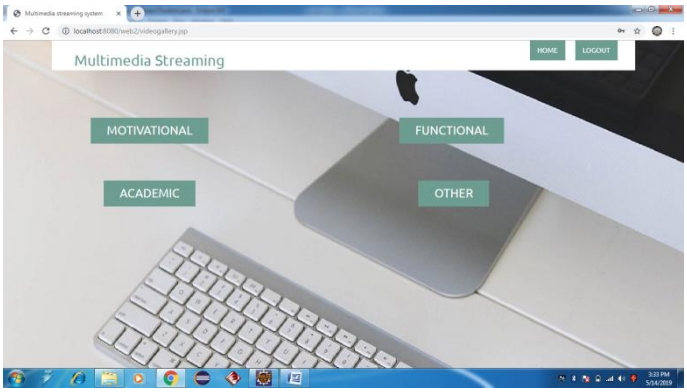
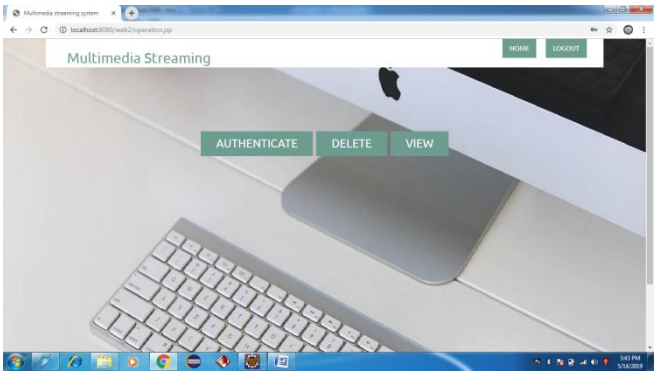
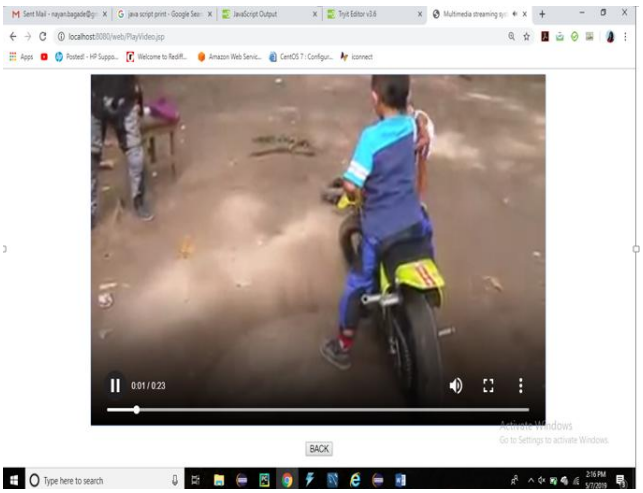
Video Category



Admin Page



Video play with streaming



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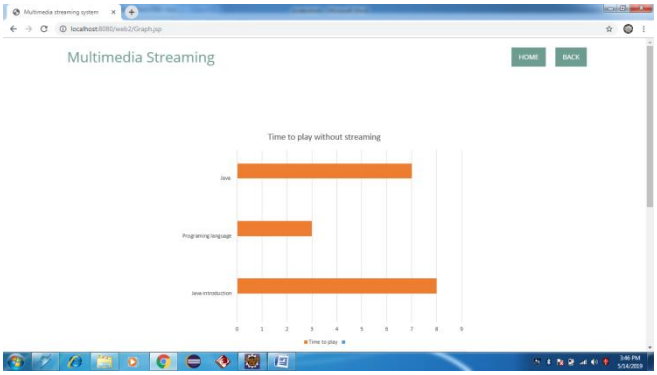
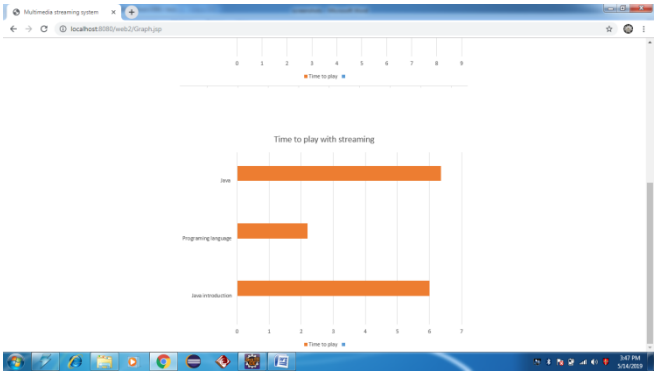
Video playing without streaming

VI. RESULT AND ANALYSIS



Above graph shows video names on x axes video playing time on y axes without streaming this video is played by url and difference between video play time and pause time is calculated.



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Above graph shows video names on x axes video playing time on y axes with streaming this video is played by url and difference between video play time and pause time is calculated. As shown in graph with streaming video require less time to play as well as no storage space occupy at client side

VII. DISCUSSION AND FUTURE SCOPE

For internet user to experience quality multimedia deliverables on the fly video streaming is a novel technology encompasses a broad area of research. Streaming media is in rapid growth with social and commercial users. *Streaming* is an enabling technology for providing multimedia data delivery among clients in various multimedia applications on the Internet. With this technology, the client can playback the media content without waiting for the entire media file to arrive. Thus, streaming allows real-time transmission of multimedia over the net. Internet streaming media changed the Web as we knew it - changed it from a static text- and graphics-based medium into a multimedia experience populated by sound and moving pictures. The basic idea of video streaming is to split the video into parts, transmit these parts in succession, and enable the receiver to decode and playback the video as these parts are received, without having to wait for the entire video to be delivered. Thus, streaming enables near instantaneous playback of multimedia content in spite of their sizes.

The video delivery landscape is currently an extremely fast evolving technology. The classical linear television is being transformed, complemented, and partially replaced by new services that are by design interactive, individualized, and interconnected with the social platforms. One of the pillars required to support this evolution is an ubiquitous high-speed communication platform, such as the Internet. Due to its core design principles, however, the Internet does not provide any Quality of Service (QoS) guarantees, and thus, applications have to dynamically adapt their requirements to the available QoS level. In particular in wireless networks, that will soon be the dominating Internet access technology, the users, specifically if they are mobile, are exposed to continuous link quality fluctuations. Moreover, the time constraints in the case of live streaming, and the continuously increasing throughput requirements of the video services (High-Definition (HD), Ultra-High-Definition (UHD), Virtual Reality (VR), Augmented Reality (AR), etc.), further increase the challenge.

VIII. CONCLUSION

The proposed system will provide a simple mechanism for publishing and discovering multimedia web services. The proposed ATCP+ algorithm includes two main concepts, that is, segmentation and multithread downloading, for achieving better streaming performance based on general HTTP protocol. The ATCP+ dynamically adjusts the segment length according to the condition of network congestion to provide steady video streaming throughput in shortest time period. The detailed design description gives the roadmap for the implementation and evaluation.

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