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RESEARCH ARTICLE

Virtualization Strategy to Implement Cloud-Based IPTV System and to Optimize Cloud Resources

Madhuri A[1], Venkataravana Nayak [2], Sunanda Alur [3,] Krishna Gudi [4]

[1] Department of Computer Science, Visvesvaraya Technological University/GSS Institute of Technology/Bangalore, Karnataka, India

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Corresponding Author

Madhuri A

Abstract

IPTV (Internet Protocol Television) system delivers the television services through IP suite over a packet-switched network such as internet. Virtualization is said to be an emerging IT paradigm that separates computing functions and technology implementations from physical hardware. Cloud computing can be said as virtualization of computer programs through an internet connection rather than installing applications on every computer. In this paper, our main idea is the usage of virtualized IPTV architecture and intelligent time shifting of service delivery that lowers the provider's cost in delivering real-time IPTV services. In order to lower the cost, we statistically multiplex the IPTV services such as Live TV, VoD (Video-on-Demand) and so on by taking the differences in the boundary lines assigned to the Live TV versus VoD. In order to compute the amount of resources needed to support multiple services, without missing the boundary line for any service a widely applicable supporting structure can be provided. We construct the problem as an optimization formulation that uses a generic cost function. This formulation gives the number of servers needed at different time instants to support the services. By taking the advantage of Virtualization strategy and Statistical multiplexing method the operators can gain greater cost savings.

INTRODUCTION

Cloud Computing lets us use files and applications over the internet, it is said to be a new infrastructure environment which delivers the on demand services. IPTV is the system that delivers all the television services through Internet Protocol suite over a packet-switched network such as an internet. IPTV includes the services like Live TV, VoD (Video-on-Demand), Time-shifted TV and so on. An IPTV service like Live TV is typically multicast from servers using IP Multicast, with one group per TV channel. Where unicast stream used to deliver VoD by the service operator for each request being served by a server. When users tend to change channels while watching Live TV, for each time channel changed, the user should join the multicast group associated with the channel, and wait for required data to be buffered before the video is displayed, this can take some amount of time. As a result, there have been more attempts to support ICC (Instant Channel Change) by reducing the user perceived channel switching latency [1]. With the typical ICC implemented on IPTV systems, unicast stream from the server delivery the content at an accelerated rate the switching latency will be less when the playout buffer is stuffed up quickly. As the Play out buffer is stuffed up to the playout purpose, the set top box activity backs to receive the multicast stream [2]. Our main aim in this paper is to take advantage of virtualization strategy and statistical multiplexing method to deliver IPTV services like LiveTV, VoD and so on that results in gaining the great cost savings to the operator, for this we

take advantage of the differences between the boundary lines of the various IPTV services for the maximum utilization of the deployed servers, taking advantage of the of the buffering available at the receivers, it offers opportunities for the service provider to deliver the VoD content potentially out of order. Virtualization strategy enables us to flexibly share the server resources across the services and use: a) cloud computing infrastructure with virtualization in shifting the resources dynamically in real-time to handle ICC workload b) to be ready to anticipate the corrections within the work before time and preload VoD content on set top boxes, thereby facilitating the shifting of resources from VoD to ICC during the bursts and c) to solve the general cost problem of optimization formulation without having too meticulously model each and every parameter setting in an exceedingly data center to facilitate the shifting of resources [3]. In an virtualization environment, the ICC is managed by a group of virtual machines typically, alternate virtual machines would be created to handle Video-on-Demand requests. With the power to create Virtual machines quickly the server will be shifted (VM's) from Video-on-Demand to handle ICC workload

II. BACKGROUND

IPTV means delivering enhanced video applications over a manged or dedicated network via internet protocol. In the IPTV services the TV channels are encoded in IP format and deliverd to TV using a smart Electrical Electronic device. The service i.e., VoD is similar to watching Video CD's/ DVD's using VCD/ DVD/ CD players. From an engineering perspective, IPTV places both the significant steady state and transient demands on network bandwidth. IPTV streaming techniques incur delays to stuff the play-out buffer, It is very important to minimize this latency for the betterment of viewers to switch or surf channels. In order to reduce this latency the technique so called, ICC (Instant Channel Change) was introduced by having a separate unicast assist channel for every viewer changing channels. Rather, a multicast-based approach using a secondary channel change stream was proposed in association with the multicast of the regular quality stream for the channel requested. The Instant Channel Change includes the Unicast Instant Channel Change Scheme and Multicast Instant Channel Change Scheme [2]. The Unicast Instant Channel Change uses accelerated unicast streams to stuff the play-out buffer, thus reducing the wait at the STB [5]. The Multicast Instant Channel Change is the secondary lower-bandwidth channel change stream that corresponds to each channel at the server.

III. PROPOSED WORK

IPTV services such as Live TV and VoD are delivered using the Internet. The combination of IPTV, VoIP and Internet access services is known as Triple play. The combination of triple and mobile voice services leads to quadruple, where these services are delivered by corporate LAN's and Business Networks. In this paper, a) We represent a Server as a Service Provider, called the VOD Server, fed by Multimedia Resources and handling the request that is incoming from the Remote User in which IPTV is constructed as described in a local media player, b) As the mm file is divided into 'N' Number of packets from each sub-stream arrive at the VOD Server, they are stored in the Cloud for reassembly to reconstruct the full stream to the remote user. c) Portions of the stream that have been reconstructed from the VOD Server are then played back to the user as IPTV Services. In addition to providing a reassembly area, the VOD Server also enhances the user to absorb some variability's in available network bandwidth and network delay (VOD Server will enhance the Bandwidth as per the MM file request). d) This System provides a generalized framework for computing the amount of resources needed to support multiple services, without missing the deadline for any service. e) This System implements a simple mechanism for time-shifting scheduled jobs in a Real Time VOD Server and study the reduction in server load using real traces from an operational IPTV network[2] [6].

Advantages: User easily buys the channel using Internet, LiveTV Controller, Video-on-Demand, Ease of installation and operation, Competitive pricing.

IV. IMPLEMENTATION

In this paper, four main modules are implemented:

1. Deadline Constraints and Scheduling- Each channel pack has some deadline constraints and scheduling. The deadline constraints provide the limited period of time to the channel pack. User using the channel packs within the period, suppose your channel period time is finished that time automatically you lose the channel pack, also Admin provides the alert message to user two days before in channel pack period using deadline constraints.

There are three types of constraints:

1. Flexible Constraint: This is a default type of constraint in project. It means that a task can start as soon as possible. 2. Semi-Flexible Constraint: A task must begin or end no later than the defined date. 3. Inflexible Constraint: A task must begin or end on a certain date.

2. User Complaint- In this module we complaint about the channel i.e.; video clarity, sound clarity and so on, with the help of complaint box. Then the admin views the complaint then take action to that complaint. Finally users view that complaint status.

3. Optimization- In this module user selects the cheap and best channel pack. In this project optimization, there are three methods:

1. Linear Cost Function: Cost function in which the graph of total costs versus a single cost driver forms a straight line within the relevant range.

2. Piecewise Linear Convex Cost Function: Scheduling of the incoming requests which uses vi server resources a time i. Suppose that we only serve min (yi, K) of the requests and drop the remaining. The cost of using server's yi at time i is given by total number of requests + c times the number of dropped requests. We know that the earliest deadline first strategy minimizes the number of dropped requests and hence the optimal strategy for the cost is as follows. Suppose that when we use earliest deadline first as the strategy with K as the number of servers, ˆsi be the number of requests served in time i and ˜si is the number of requests dropped (Note that ˜si = 0 if ˆsi < K.). Then si = ˆsi + ˜si is an optimal solution.

3. Exponential Cost Function: This is a convex optimization problem with integer constraints, and is thus NP hard problem in general. We here provide an achievable solution based on convex primal-dual method.

4. Multiple Services- The remote user can have multiple polices such as the services can take place simultaneously namely VoD and Live TV (whose service requirement is primarily to serve the ICC requests).Here Vod and Live TV are same but the services such as the channels will be different from both the TV Services.

The user gets logged inn to Amazon Workspace (AWS) Cloud, which directs the user in to the Amazon workspace cloud.

V. RESULTS AND ANALYSIS

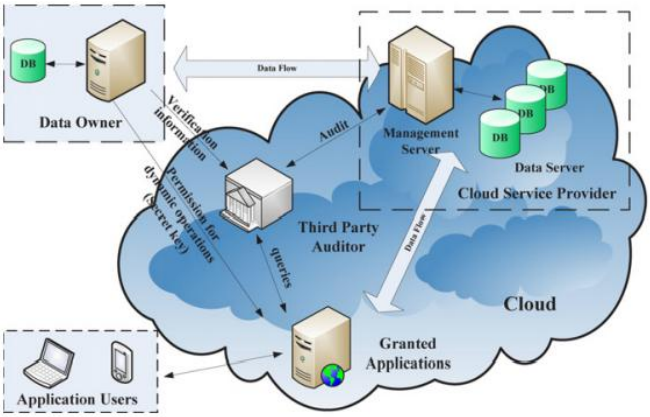


Fig 1: Typical IPTV Architecture

Features

	Live TV & VOD IPTV	**IPTV through virtualization**
Data Transfer	Use general internet	Use dedicated private network
Whole geographical reach	Can be accessed from anywhere in the globe	Limited by service provider
Service quality & quantity	Not guaranteed	Guarantees high quality audio and video
Data access mechanism	A PC with media player	Set-top-box most of the time

TABLE-1: Comparison of IPTV with Virtualized IPTV

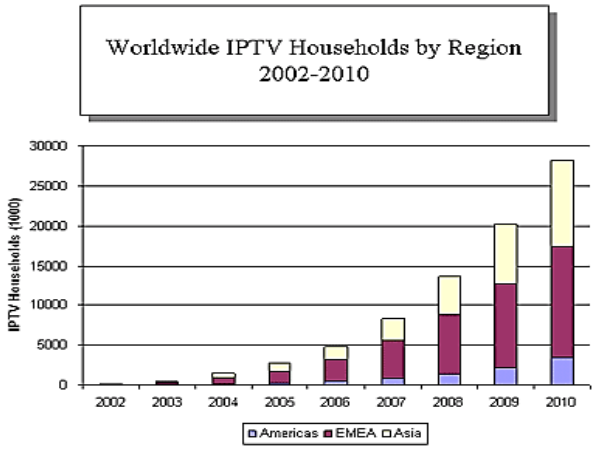


Fig 2: Growth of IPTV

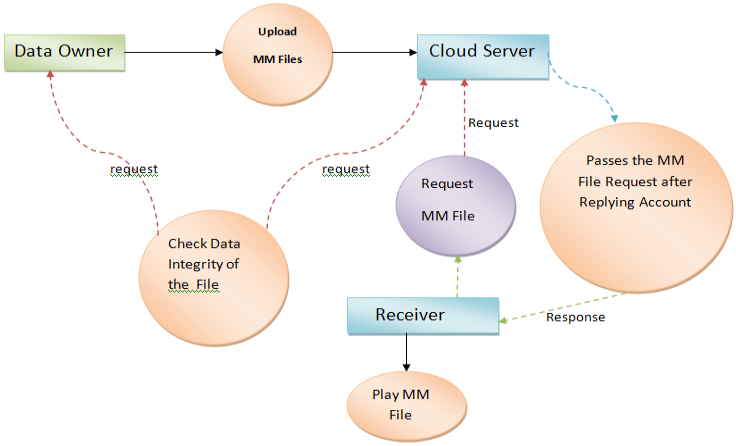
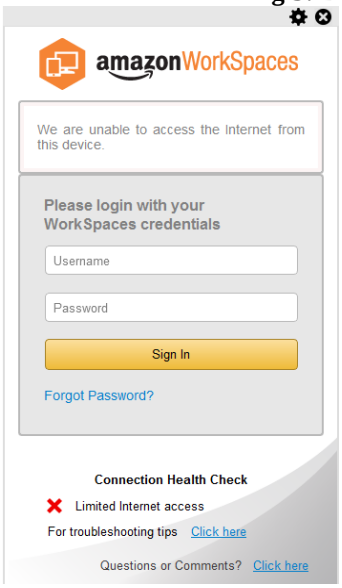
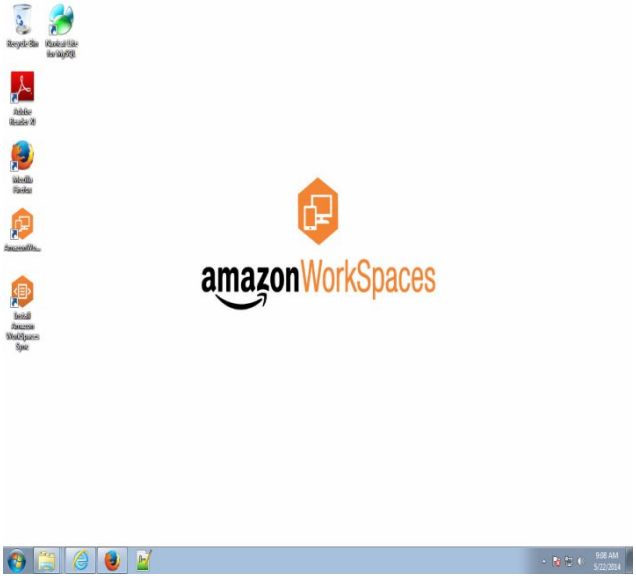


Fig 3: Data Flow Diagram of IPTV System Implementation



.[a]



[b]

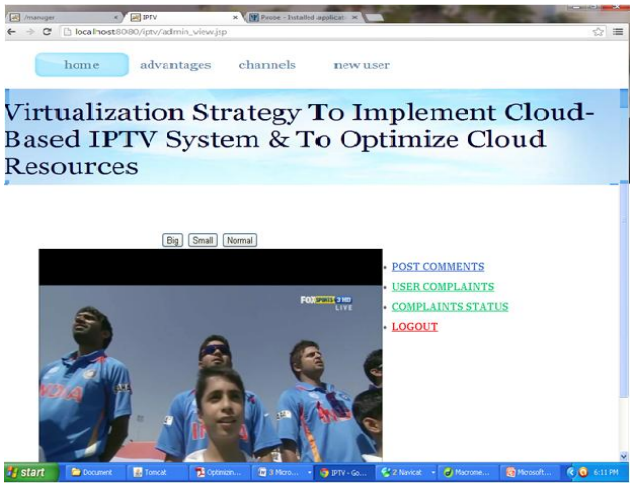
[a]The user gets logged inn to Amazon Workspace (AWS) Cloud, which directs the user in to the Amazon workspace cloud, [b] The Amazon Workspace Cloud Desktop.

The Welcome Page, where the User or Admin can login

The New User Registration Page for the user to sign up for the service.

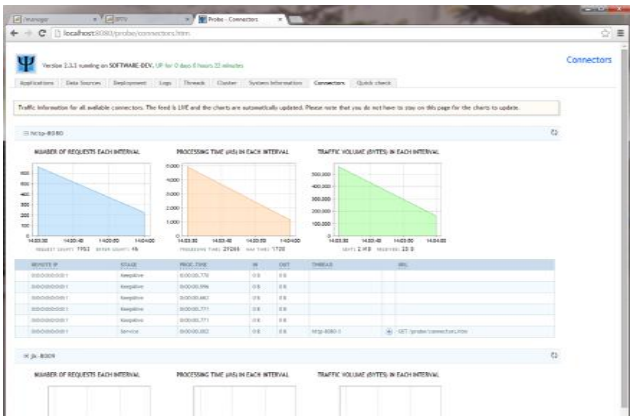
List of all the available channels.

The channel subscribing packages for user cost optimization



Shows the window by which the user can view the selected channel.

Shows the window that contains complaint box, where the user can post a complaint to the owner or admin.



The window that shows the graphs representing memory usage, processing time and the number of requests made.

The Live TV statistically multiplexed, where user can view different channels by instantly changing channels,

VI. CONCLUSION

In this paper, IPTV service operators will leverage a virtualized cloud infrastructure and intelligent time-shifting of load to maximize utilization of deployed resources for ICC (Instant Channel Change) and VoD delivery. Time shifting reduces the workload as well as ICC and VoD delivery as examples. As a future work, we focus on providing the IPTV services through social networking to improve security and the performance by keeping the simple and standard protocols and procedures respectively.

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