Optimizing Network Bandwidth For Multimedia Streaming Application: XStream

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***Abstract*–Streaming is a technique followed by many multi-national organizations mainly for multimedia sharing and also for video conferencing. The data to be streamed generally resides on a single server or a network. These days, increasing size of the data on the servers is causing havocking decrease in the overall user experience in multi-media streaming on various platforms. This paper explains about XStream application which proposes a new method for streaming multimedia data stored on a known server. It also provides guaranteed real-time delivery of the data with maximum utilization of network bandwidth.The client can access the server directly after successful authentication. The server and client can be instantiated on Android devices, Windows Desktop or Laptop**.

***Keywords*–Multimedia Streaming, Network Bandwidth, Multi-threading, Optimization, Protocol**

I. INTRODUCTION

Nowadays, for Multimedia Streaming YouTube is used on a wide range. But it requires mandatory internet connection and bandwidth provided by ISP. If a multimedia file has to be accessed without using internet then it needs to be downloaded. Due to this, there is high probability of having redundant data on multiple devices in the same subnet.

The actual content and data redundancy on clients and servers all together is increasingthe overall demand of hardware for data storage. XStream allows theclients to access the data present on the server using internet as well as intranet.In the proposed application, server will be the master entity present in the localor foreign domain which is shared only to the clients having the appropriateauthentication for the network. The proposed platforms for this system will bethe androids, the windows desktops. The system provides faster media accessto the server than the legacy systems.The application will also use the multi-threading technology to reduce the stress over the server.

A. Problem Statement

To reduce the data redundancy across a network. Also to optimize the usage of bandwidthof the network for multi-media streaming. Device an application to providefacility to stream multimedia files.

II. LITERATURE SURVEY

In this paper the techniques which are used are explained below:

1) Real-Time Transport Protocol (Denoted as RTP) is the protocol that is being used in this application. The RTP is a protocol used for multimedia streaming purposes. The TCP is standardized for RTP but for timeliness UDP is preferred over TCP.
   - Data Transfer Protocol: Facilitates the transfer of real-time data. Information provided by this protocol include timestamps (for synchronization), sequence number and the payload format which indicates the encoded format of the data.
   - Real-Time Control Protocol: Is used to specify quality of service (QoS) feedback and synchronization between the media streams.
2) SQLite is an open source database. SQLite database takes less memory on runtime and also provides all possible features of SQL such as transactions and management and prepared statements. Additionally, SQLite database is embedded into every android device by default.Accessing this database provides you access to the android File System. For setting up server on the android device access to file system is necessary therefore, it is mandatory to consider SQLite database and respective queries.
3) Multimedia Database is a database which provides utility to access the semi structured or unstructured data residing within itself. The data may contain text files, audio files, image files or even the video files. The multimedia database has capability to connect with the query language as well as the higher third generation languages like java. Therefore a suitable platform to be used for multimedia storage in Windows platforms. Hence, for setting up the server in Windows platform it is being used.
4) User Interface for an application will be designed for two platforms namely Windows Desktop and Notebooks, Android. The UI should be adequate and efficient for the daily use. Android platform

extensively supports XML for UI design and development. Therefore XML will be used.

III. PROPOSED SYSTEM

1) The XStream client has a closed privacy access to the local XStream server. Clients can access, copy only the media which is present on the local server.
2) The system will provide the list of the nodes which have been deployed as servers in the same network and quick connectivity on a button click or a touch.
3) The proposed system allows the user to access a file from the server which is deployed as a server in the same subnet.
4) The request handling is done by using the multi-threading techniques.
5) As thread management will be taking place, maximum utilization of available bandwidth can be achieved.

IV. SYSTEM ARCHITECTURE

1) Local Server:
This is the site in the local network where the data is physically present. It holds the authority to access database.

2) Database:
The database is the logical organisation of data which is needed by the admin to be accessed.

3) Access Point:
It provides a media bridge between the clients and the network router for accessing the server.

4) Network Router:
It provides accessibility to the internet and establishes connection between local server and the remote Client.

5) Clients:
These devices are present locally in the network i.e. they can request for the data via intranet.

6) Remote Clients:
These request the data via internet.

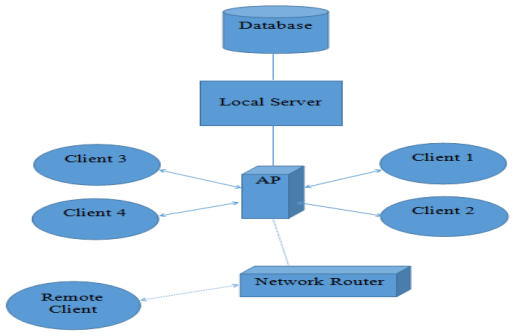

Fig 1: System Architecture

A. Hardware and Software requirements

1) Minimum Hardware Requirements
1. For Windows-512 MB RAM
2. Android mobile device with 1 GHz processor 512 MB RAM
3. Moderate storage space
4. Wireless Access Point
5. Internet Connection (for remote connection only at 256 kbps)

2) Minimum Software Requirements
1. Android 4.4 OS (Kitkat)
2. Windows XP and above

V. SYSTEM FEATURES

1) User Login:
On login screen, the user with appropriate authentication scheme, can login to the XStream application.

2) Mode Selection:
The user after a successful login can select among the server mode and the client mode for the device. Both modes enable the device to perform distinct functions.

3) Server Mode:
In this mode, the user can update the database or even can suspend the device in the same mode to provide the database access to the clients which demand for the same.

4) Client Mode:
This mode allows the user to search for the needed file from the server database and choice to stream or download the same.

5) Extensive Streaming(XStream):
The system allows the local client to search for the file from the local server without internet connection and can provide streaming speed up to the limit of the lowest capable Access Point from the network.

$$speed\ of\ stream = \frac{network\ bandwidth}{number\ of\ clients}$$

6) Dynamic switching:
The client can switch to the server mode whenever wanted. At the penalty of streaming. The server device cannot access any other server.

5.1 Methodologies of Problem Solving and EfficiencyIssues

1) Parallel Computing –
Threading to be done by taking advantage of hyperthreading. The thread pool is assigned a

particular client on connection if authenticated. Executed on demand.

2) *Multi-Core* –
Each core can execute single thread that has been assigned to it with the help of efficient scheduling algorithm. That is, each core is assigned to a client itself, therefore faster execution and better performance.

3) *Casting Specs* –
Broadcasting and Multi-casting features allows the application scope expansion.

VI. ALGORITHM

This paper explains about the algorithm which is being used in our application. The following algorithm tells about two main components:

A. *Server*

1) Start the XStream application.
2) Select the server mode from the mode decision pane.
3) Select update mode if updating the database is required go to 5.
4) Select Keep Alive if the server has to be kept in the reaction mode. Go to 6 when device has to be disconnected as a server.
5) Select the file to be put into the database and add it via the User Interface.
6) Go back to the mode selection pane or exit and go to 7.
7) Stop.

B. *Client:*

1) Start the XStream application.
2) Choose client mode to get into in to the client mode.
3) Select the server from the network from which the file is to be accessed.
4) Fill in the username and password to authenticate.
5) If the username and password matches, go to 7.
6) If username and password does not match, re-enter the credential or stop.
7) Select file type from Pictures, Music, Videos and Documents.
8) Select the required file.
9) Select whether to stream or download the file.
10) Go back to the mode selection pane or exit and go to 11.
11) Stop.

VII. ADVANTAGES AND DISADVANTAGES

A. *Advantages*

1) XStream allows the users to stream media from a local server using intranet.
2) There is no caching of media during local streaming therefore space is saved.
3) Maximum bandwidth is utilized.
4) Downloading of files is also allowed.

B. *Disadvantages*

1) Media which is not present on the server cannot be retrieved.

VIII. APPLICATIONS

1) During conferences, the media from the presenter can be streamed or downloadedby the client without any loss. Saving the time and resources.
2) During large concerts and events, the audience to whom the stage is not visible can stream through their devices by giving them open access to the server which is capturing the event.
3) The application can also find use in Distance Learning domain.
4) The media files from one local server can be accessed from anywhere aroundthe globe which saves the space across the client devices.
5) Once you have the media on the server, no need to carry it to any other device.

IX. FUTURE SCOPE

1) The multimedia database used can be optimized by using database technology which could provide lower file fetch and access time.
2) Compression algorithms that are to be used on the server side will significantlyreduce the media size, saving a huge space on the server.

X. SUMMARY AND CONCLUSION

XStream application is cross platform and can be used on Windows platform as well as the android platform. It is possible to provide optimal network usage support to the devices with and without usingthe internet up to a certain range. The platforms on which the application is runnable are not very high end or resourceful i.e. they can be moderate.

The portion of a network can be reserved and reused in order to achieve a better network utilization quotient. Multithreading and parallel processing can be used in order to handle the clients. Using the RTP, application can reduce the congestion in the network by reducing the packet size of the media files. The quality of media can be improved by using multi-codec packages.

XStream application provides higher degree of support to the above constraints by providing a better GUI.

The XStream application supports no partial caching which saves a lot of disk space. How much? A moderate YouTube user generates a cache of nearly 1GB in 2 days at 360p. This application gives a major support of optional download of a file which is not seen in any of the other parallel applications.

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