CS 553: Internet Services

Project - Video Streaming as a Web Service

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1 Introduction

People love to watch events live especially those of our favorite sporting teams and concerts from our celebrity entertainers. But when itâĂŹs difficult to attend a live event, we gather to watch the special moments in real-time on television or over the internet in High Definition.

Over the past year, due to the ease of a new breed of technology with incredibly low cost, we can now find business information, seminars, workshops and webinars which are being broadcast Live to a global audience over the internet.

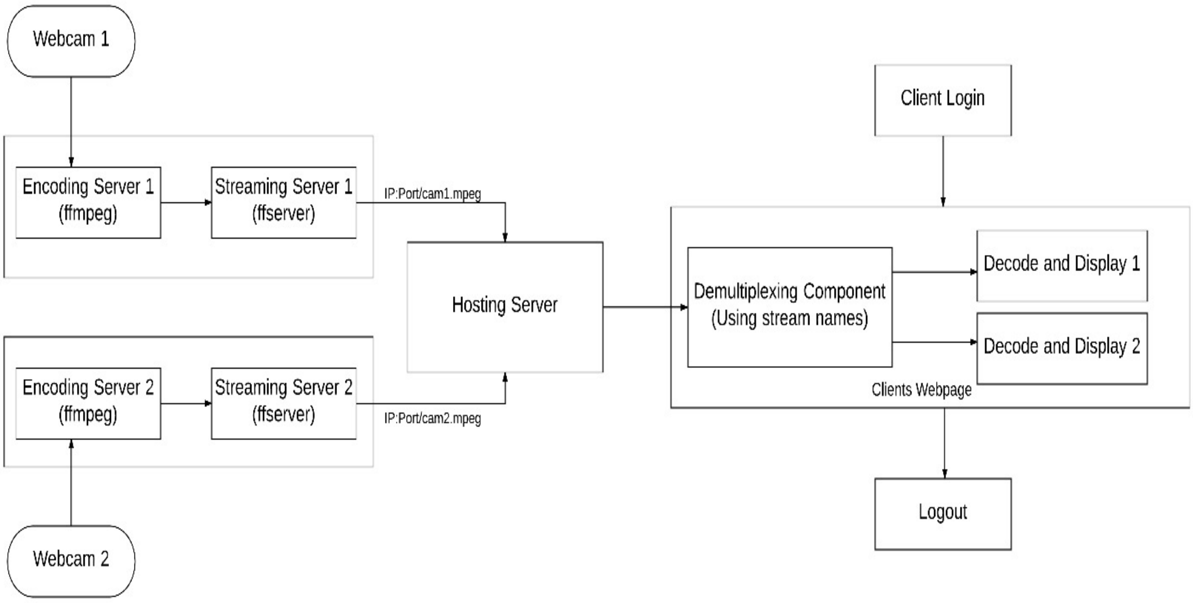
Livecasting or livestreaming is often the term used that describes the process of broadcasting real-time, live video footage or video feed to an audience accessing the video stream over the internet. The viewing device can be a desktop computer, laptop, tablet, smartphone or digital screen. The broadcast can be just video, audio or both.

2 Description

Streaming video is content sent in compressed form over the Internet and displayed by the viewer in real time. With streaming video or streaming media, a Web user does not have to wait to download a file to play it. Instead, the media is sent in a continuous stream of data and is played as it arrives. The user needs a player, which is a special program that uncompresses and sends video data to the display and audio data to speakers. A player can be either an integral part of a browser or downloaded from the software maker's Web site.

This service has wide ranging applications in different industries. It can be used for broadcasting content from sports matches to monitoring security cameras and even for checking the integrity of students in a take home exam.This service is highly portable and easy to set up.

3 Flow of the service


Webcam 1
Encoding Server 1 (ffmpeg)
Streaming Server 1 (ffserver)
IP:Port/cam1.mpeg
Hosting Server
Encoding Server 2 (ffmpeg)
Streaming Server 2 (ffserver)
IP:Port/cam2.mpeg
Webcam 2
Client Login
Demultiplexing Component (Using stream names)
Decode and Display 1
Decode and Display 2
Clients Webpage
Logout

4 Technologies Used

4.1 ffserver and ffmpeg

ffserver is a streaming server for both audio and video. It supports several live feeds, streaming from files and time shifting on live feeds. You can seek to positions in the past on each live feed, provided you specify a big enough feed storage.ffserver is configured through a configuration file, which is read at startup. If not explicitly specified, it will read from /etc/ffserver.conf.ffserver receives prerecorded files or FFM streams from some ffmpeg instance as input, then streams them over RTP/RTSP/HTTP.

An ffserver instance will listen on some port as specified in the configuration file. You can launch one or more instances of ffmpeg and send one or more FFM streams to the port where ffserver is expecting to receive them. Alternately, you can make ffserver launch such ffmpeg instances at startup.

Input streams are called feeds, and each one is specified by a <Feed> section in the configuration file.For each feed you can have different output streams in various formats, each one specified by a <Stream> section in the configuration file.

FFmpeg is a free software project that produces libraries and programs for handling multimedia data. FFmpeg includes libavcodec, an audio/video codec library used by several other projects, libavformat (Lavf),[6] an audio/video container mux and demux library, and the ffmpeg command line program for transcoding multimedia files.

4.2 Python with Flask

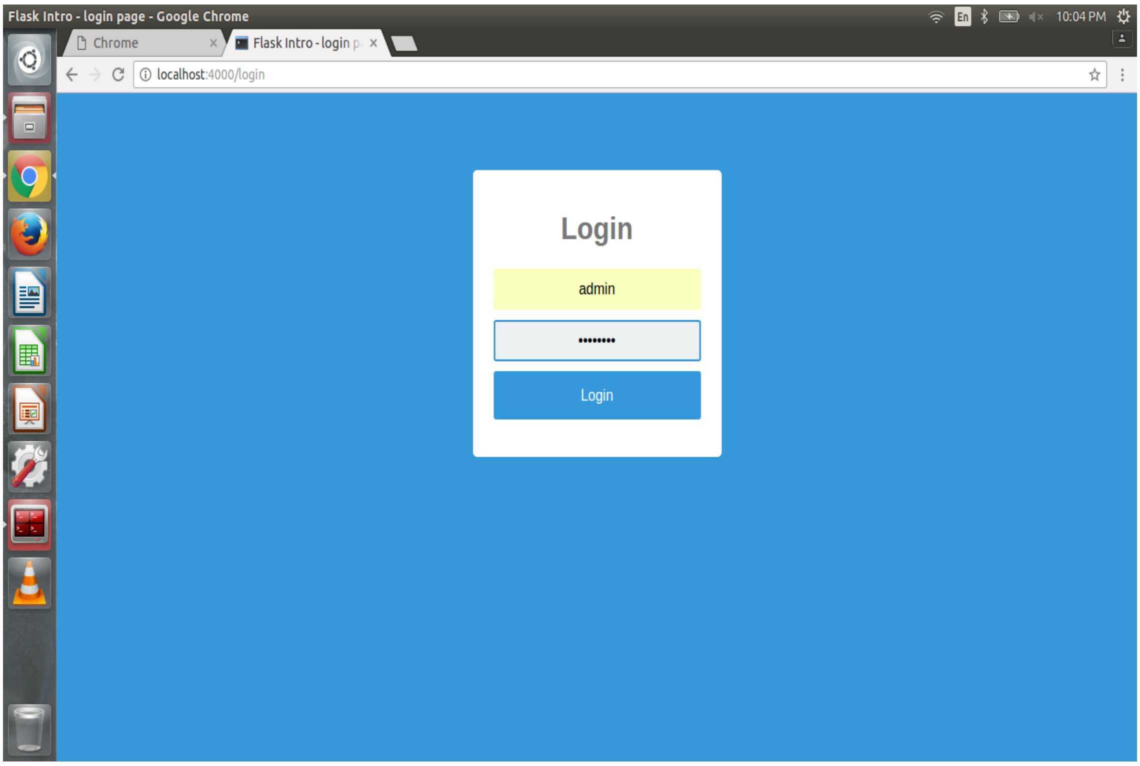
Flask is a micro web framework written in Python and based on the Werkzeug toolkit and Jinja2 template engine. Flask is considered more Pythonic than Django because Flask web application code is in most cases more explicit. Flask is easy to get started with as a beginner because there is little boilerplate code for getting a simple app up and running.

4.3 SQLite

SQLite is an embedded SQL database engine. Unlike most other SQL databases, SQLite does not have a separate server process. SQLite reads and writes directly to ordinary disk files. A complete SQL database with multiple tables, indices, triggers, and views, is contained in a single disk file. The database file format is cross-platform - you can freely copy a database between 32-bit and 64-bit systems or between big-endian and little-endian architectures. These features make SQLite a popular choice as an Application File Format.

5 Screenshots

5.1 Login Page



admin

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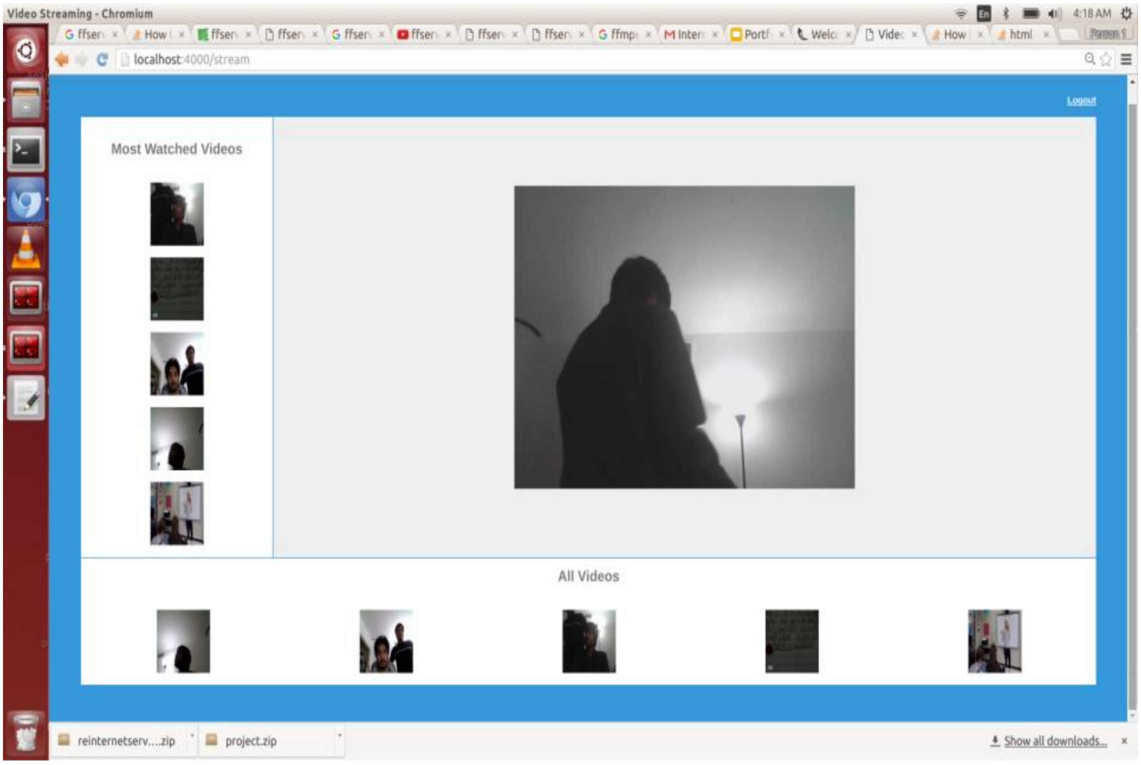
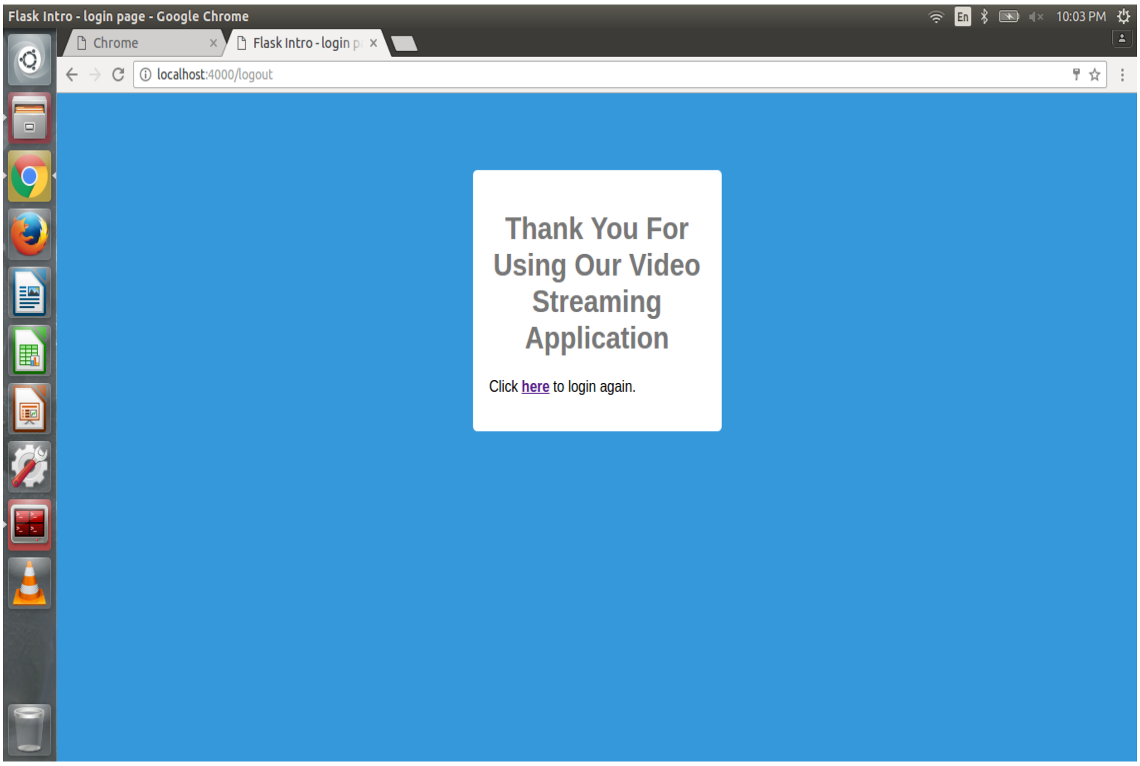
5.2 Main View


Video Streaming - Chromium
4:18 AM
localhost:4000/stream
Logout
Most Watched Videos
All Videos
reinternetserv....zip
project.zip
Show all downloads...

5.3 Logout Page

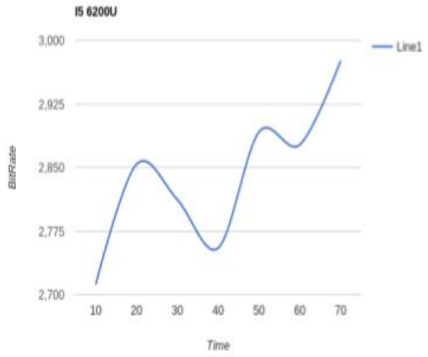


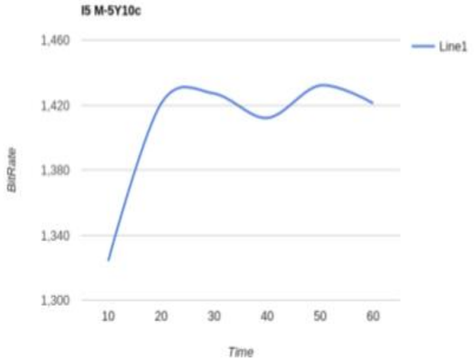
Thank You For Using Our Video Streaming Application

Click here to login again.

6 Analysis of the Video Streaming application

6.1 Bitrate vs Processor





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7 Conclusion

Video Streaming is one of the most widely used applications and making it lightweight is major challenging task. In this application we tried to keep the overheads to as minimum as possible. We were able to get significant results with expected bitrate and keeping the latency as low as possible. The dynamic UI which we developed using jinja2 framework makes it more interactive to the user. Also this application has end to end encoding which made the application more secure and less vulnerable to attacks. Thus this application can be used in broadcasting content from sports matches to monitoring security cameras and even for checking the integrity of students in a take home exam. If we had to do the project all over again, then we might probably have used Django instead of flask given that we had a problem statement for scaling. Also, we would use a front end framework like BootStrap and host it in AWS.

8 References

1. http://flask.pocoo.org/
2. http://www.w3schools.com/