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| Bach Khoa University |
| Computer Network Assignment 1 |
| Video Stream Programming Report |

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# Video Stream Programming Report

The Program includes 5 files:

* Client.py
* ClientLauncher.py
* RtpPacket.py
* Server.py
* Server.Worker.py

## Run Server.py on Server Terminal to start server:

python Server.py server\_port

server\_port is the port your server listens to for incoming RTSP connections

# We can give it the value 1025

# Standard RTSP port is 554

# In this project we shall make the value > 1024

## Run ClientLauncher.py on Client Terminal to start a client:

python ClientLauncher.py server\_host server\_port PRT\_port video\_file

server\_host is the IP address of local machine (we can use “127.0.0.1”)

server\_port is the port the server is listening on (here “1025”)

RTP\_port is the port where RTP packets are received (here “5008”)

video\_file is the name of video file that we want to play (here “movie.mjpeg”)

RTSP (Real Time Streaming Protocol):

For entertainment and communications systems to control streaming media servers. Establishing and controlling media sessions between end points. It uses TCP.

RTP (Real-time Transport Protocol):

Network protocol for delivering audio and video over IP Networks. It uses UDP.

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Description générée automatiquementHow RTSP and RTP work together?

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Description générée automatiquement

What will be sent from client to server via RTSP Protocol are the commands like:

* SETUP
* PLAY
* PAUSE
* TEARDOWN

These commands will let server side know what next action; it should complete.

What will be replied from server to client via RTSP Protocol are the parameters like:

OK\_200

FILE\_NOT\_FOUND\_404

CON\_ERR\_500

To tell the client if the server receives its commands correctly.

After client receives server`s reply, it will change its state accordingly to:

* READY
* PLAYING

If SETUP command was sent from client to server:

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Description générée automatiquement

The “SETUP” RTSP Packet will include:

1. Setup command.
2. Video file name to be play.
3. RTSP Packet Sequence Number starts from 1.
4. Protocol type: RTSP/1.0 RTP.
5. Transmission Protocol: UDP.
6. RTP Port for video stream transmission.

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Description générée automatiquement

When Server side receives “SETUP” command, it will:

1. Assign the clint a Specific Session Number randomly.
2. If something wrong with this command or server’s state, it will reply ERROR packet back to client.
3. If command correct.

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Description générée automatiquement

The server will open the video file specified in the SETUP Packet and Initialize its video frame number to 0.

## If command processes correctly, it will reply OK\_200 back to client and set its STATE to READY

The Client side will loop to receive Server`s RTSP Reply:

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Description générée automatiquement

Then Parse the RTSP Reply Packet:

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Description générée automatiquement

And if the Reply Packet is responded for the SETUP command.

The client will set its STATE as READY:

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Description générée automatiquement

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Description générée automatiquementThen open a RTP Port to receive incoming video stream:

Afterward, if PLAY RTSP command was sent from client to server:

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Description générée automatiquement

The Server will create a Socket for RTP transmission via UDP, and start a tread to send video stream packet:

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Description générée automatiquement

VideoStream.py will help chop the video file to separate frame, and put each frame into RTP data packet:

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Description générée automatiquement

Each data packet will also be encoded with a header, the header will include:

* RTP-version filed
* Padding
* Extension
* Contributing source
* Marker
* Type Field
* Sequence Number
* Timestamp
* SSRC

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Description générée automatiquement

They have been inserted in the RTP Packet via bitwise operations:

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Description générée automatiquement

Finally, the RTP Packet will include a header and a video frame be sent to the RTP Port on the client side:



Then Client decode the RTP Packet to get the header and the video frame, reorganize the frames and display on the UI:

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Description générée automatiquement

If a PAUSE command was sent from client to server, it will stop the server from sending video frames to client.

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Description générée automatiquement

If a TEARDOWN command was sent from client to server, it will also stop the server from sending video frames to client and close the client terminal as well.

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Description générée automatiquement