

Media Service With Optimized Multi-Level Approach to Video Streaming

Hryshchuk, Dmytro (School: Lyceum #21 of Zhytomyr City)

This research project explores a novel media service platform designed to optimize video streaming. Modern media delivery faces two key challenges: inter-server video transfer inefficiencies and the lack of ready-to-deploy media platforms. My system is built on a microservices architecture, featuring a media server that processes formats, re-encodes video, and segments content for HLS-based client broadcasting. The project includes a media server backend, a website frontend for clients and applications for smartphones and smart TVs. To achieve this, I developed a custom segmented protocol for server-to-server communication, built on HTTP chunked streaming. Unlike traditional pull-based methods like HLS and MPEG-DASH, which require periodic playlist updates, my custom segmented protocol notifies the receiving server immediately when new segments are available. This reduces latency and improves responsiveness of the streaming platform. Key features include segment timestamps, stream source/receiver synchronization and archive data transfer support. Our platform has been successfully tested in real-world scenarios, handling 12,141 simultaneous users while sustaining a total output of over 15 Gbit/s. It delivers a reliable media experience across diverse devices and network conditions under load. Standard QoS testing confirmed a 98% transfer quality rate, and server-to-server latency was reduced from 24 seconds to just 2 seconds. The system enables simple deployment with no technical expertise required and the protocol can be integrated into existing IPTV services to enhance their performance.

Awards Won:

