# Homework Number: 6

# Paper Title: Segment-Based Proxy Caching of Multimedia Streams

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# Summary:

Proper proxy caching of huge multimedia objects has become more crucial as streaming video and audio over the Internet gains popularity. It is inappropriate to treat a 2-hour video as a single web object for caching when it is a huge media asset. Segments of varying sizes are created from the blocks of a media stream that a proxy server receives. The segment distance from the media's beginning is then considered by the cache admission and replacement policies, which assign various caching values to various segments. The initial segments receive preferential treatment under these caching policies. We have different design of segment-based proxy caching of media streams. Near to the client access device—which could be a PC, a TV, or another display device—is a proxy server. A user request is sent to the proxy server from a client device. The requested media asset is immediately sent to the client device if it is cached. If not, it must first be downloaded from the content server to the proxy server before being sent to the client device. For segmentation of media objects, an outlet the smallest unit of transfer is the file, which is divided into several blocks of equal size. The proxy server then aggregates several blocks into segments, and the cache admission and replacement policies assign various caching values to various segments. We consider the Cache admission policy, for better streaming, which is as follows, the main goal of cache admission control is to only let media objects with sufficient viewership into the cache. Different segments of the same media object are subject to different criteria under the admission control. The segment number, or how far a segment is from the start of the media object, is the primary factor. Cache replacement policy, the reference frequency of an object and the segment distance are the two factors that determine a segment's caching value. The ratio of the reference frequency to the segment distance serves as our simple definition of a segment's caching value. It is a straightforward denial of our preference for the first segments of objects with higher reference frequencies. We developed an event-driven simulator that simulates a proxy cache server to assess this segment-based method with various sizes. There were two LRU stacks used to observe media items in the cache. To follow up on the initial segments, with the second used to follow the later part. The variable-sized segment strategy was contrasted with prefix/suffix schemes and a full video. An LRU serves as the sole replacement in the entire video system. Every requested video is completely cached. A video is divided into a prefix and a suffix using the prefix/suffix system. The variable-sized segment approach's prefix size is the same. Additionally, the prefixes will be stored in the same amount of cache space. LRU replacement is used to manage both the prefix and suffix. Keep in mind that once an item is used as a reference in an LRU policy, it is always cached. In contrast, the variable sized segment technique has a cache admission policy. With respect to a wide range of cache sizes, the variable-sized segment approach has the highest byte hit ratio and the lowest percentage of requests with delayed starts. Blocks, up by 40% to 700,000, Although the prefix/suffix and full video techniques perform nearly equally in terms of byte-hit ratio, they drastically degrade in the percentage of requests with delayed starts. The percentage of requests with delayed commencement is noticeably higher for the full video method. For instance, using the full video technique, 60% of requests cannot begin immediately for a cache size of 400,000 blocks. Only 15.6% of requests must be delayed, on the other hand. Because the starting blocks are allocated the same amount of cache space, both the variable-sized segment and prefix/suffix techniques exhibit the same performance. We looked at how the popularity of videos skewed the byte-hit ratio and delayed start. Again, for a wide variety of degrees of skew in video popularity, the variable-sized segment strategy has the highest byte-hit ratio and the lowest fraction of requests with delayed starts. The byte-hit rates for all three technologies generally decline as the media package size does. Keep in mind that the variable- sized segment strategy has an advantage over the other two that becomes more significant as the media size increases.

# Major contributions of the paper:

* Paper has clear explanations on Cache admission policy and Cache replacement policy, which basically describes how cache is being worked on the video streaming platform.
* Experimental/Simulation results and impact of various parameters on cache performance.
* Explained how byte-hit ratio, plays an important role in simulation.

# Weak aspects of the paper and suggestions for improvement:

* Limited to only few experimental results.
* Nothing much about any clear real time example of video streaming, eg: YouTube
* Network delays as an impact isn’t considered.
* Hardware obstacles on the memory is not considered