

# The Design, Analysis, and Implementation of a Media Server Architecture

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## Introduction by James G. Hanko

In the summer of 1994, Sun's major competitors were announcing products for the emerging video on demand (VOD) market. It was determined that Sun needed a strong offering in this market to stay competitive. Since VOD would be expensive to deploy, the supplier that could reliably support a large number of customers at the lowest cost per video stream would have the greatest chance for success. After surveying the technology available at that time, we found that there were no existing systems or methodologies that would meet this goal. This technical report describes the technology that was developed at Sun to address this need.

Video on demand servers must store large amounts of video content and be able to deliver individual streams to each home, independent of the demands of other users. Rotating disk storage was the only technology available that could hold the vast amounts of data necessary to support a VOD system. However, disks have the following troubling characteristics: limited reliability (i.e., relatively high failure rate), varying performance (depending on which part of the disk is used), and non-determinism in response time to requests (due to retries and recalibration steps). Therefore, it is difficult to construct a system that can reliably deliver a large number of streams at the lowest cost per stream.

This paper details the mechanisms that were developed to address the reliability, performance, and non-determinism issues with disk subsystems in a way that reliably delivered as many streams of video as the disks were physically capable of supporting. The technology was delivered as software that controlled an off-the-shelf Sun computer and storage subsystem, and no unique hardware was required.

Sun formed the Interactive Services Group (ISG) business unit to develop a product, the Sun Media Center (SMC), based on the technology described in this paper. As a result of this technology, the product was able to meet the reliability and cost-per-stream goals.