Preface

Video has become more and more prevalent on the Internet. Studies show that YouTube has already accounted for 19.27 and 13.19% of the Internet traffics in Europe and in North America, respectively, in 2014, and it is estimated that by the year 2020, 82% of the global IP traffic will be video content. Most of Internet videos are distributed through Content Delivery Networks (CDNs). A CDN is a large distributed system consisting hundreds of thousands of dedicated content servers. Unlike peer-to-peer video streaming networks, running a CDN for holding a large-scale video service is expensive, as there are considerable costs on bandwidth usage as well as the energy consumed by the network servers.

In this book, we first review the key issues and design choices of several representative CDNs, for instance, Akamai and Google, and discuss the energy-saving techniques for server clusters, data centers, and CDNs. We then tackle the problem of saving a video streaming CDN's operating expense, including both its energy cost and the traffic cost. From our measurement study on the CDN infrastructure of Youku, which is the largest video service site in China, we find that there exists an inherent conflict between improving a video streaming CDN's energy efficiency for power saving and maintaining the CDN's ISP-friendly server selection policy. To solve this conflict, we propose a cost-aware capacity provisioning algorithm, which dynamically plans the service capacities of a CDN's server clusters in numerous ISPs and optimizes its overall operating cost regarding both the energy consumptions and the cross-ISP traffics. By using the workload derived from real-world measurement and applying actual power and bandwidth price parameters, we show with simulation experiments that our approach can significantly reduce a video streaming CDN's overall operating cost and avoid frequent server switches effectively. Finally, we discuss the directions for the future research.

For understanding the book, readers should have general knowledge on computer networks and algorithms. We hope the book can be helpful for the audience, in particular for the researchers in the Internet and networking area.

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Ye Tian
Min Zhao
Xinming Zhang



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