Peer assisted Content distribution Networks

Résumé du projet de recherche (Langue 1)

The focus of this Thesis is on the design, analysis and performance evaluation of algorithms and protocols to optimize resource utilization of Content Distribution Networks (CDN) using a hybrid system design integrating CDNs and peer-to-peer (P2P) networks. The traditional design of CDNs involves massively distributed data-centers that optimize content placement and end-users requests to meet Quality of Service guarantees heavily relying on over-provisioned systems. The goal of this project is to design hybrid architectures whereby content consumers would lower the requirements on CDNs by pooling their resources to rescue CDNs in critical scenarios such as flash-crowds, insufficient resources or simply to reduce the operational costs of CDNs. In this project, we seek a talented researcher who will advance the state-of-the-art within cooperative content distribution systems and protocols, both at fundamental theoretical and/or algorithm design levels. As a practical example, Amazon.com has realized that significant economic saving could be offered to its Web Services customers by integrating P2P networks in their infrastructure. The Simple Storage Service (S3) implements a BitTorrent interface that allows end-users to initiate a P2P session to download content from S3. As a result, instead of allocating bandwidth to serve individual requests (which represent a cost to Amazon's customers) the system leverages end-users' uplink capacity. In this project, end-users' cooperation is not limited to the content distribution itself but will be extended to the core operation of the CDN as well: P2P monitoring techniques will provide the necessary input for the CDN operation that would otherwise require resource consuming probing mechanisms. Since end-user involvement in the content distribution process and the CDN operation cannot be guaranteed, the theoretical research will focus on incentive-compatible algorithms to offer incentives for end-users to support the entire system. A prototype implementation of the hybrid architecture is the ultimate goal of the project, which is supported by a well recognized team involving colleagues from Boston University. Therefore, exchange scientific periods will be possible with US.