

Context-Aware Data Prefetching in Mobile Service Environments

Reference:

W. Hummer, S. Schulte, P. Hoenisch, and S. Dustdar, "Context-Aware Data Prefetching in Mobile Service Environments (accepted for publication)," in The 4th IEEE International Conference on Big Data and Cloud Computing (BDCloud 2014), Sydney, Australia, 2014, pp. NN-NN.

Abstract:

Mobile environments, such as vehicular communication systems (VCSs), are typically subjected to network fluctuations and intermittent downtimes, e.g., if service consumers operate in a tunnel or switch between cells of an ISP. In this work, we present an approach for service and data prefetching from the Cloud, which allows to ensure continuous service delivery and consistent quality of experience (QoE). We leverage the fact that most applications have typical access patterns, for instance streaming, or polling in regular intervals. In our system model, we consider the context under which the consumer is currently executing, including time, location, and projected route (e.g., known from GPS navigation). Based on projections for network quality at future locations, we propose a decision problem for optimizing data prefetching and continuous QoE, and discuss different mechanisms for generating service requests for prefetching. We thoroughly evaluate our approach based on a popular data set of vehicular GPS traces in Switzerland, which we deploy and simulate in a Cloud environment. In our experiments we compare prefetching approaches and address different aspects, including successful and unsuccessful invocations, prefetching hits and misses, as well as age and usage of prefetched results.