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Abstract

Cloud-based streaming services, such as real-time streaming video and gaming services, have emerged as popular online Internet applications in recent years. Providing systematic quality estimation before (or after) launching these services has raised a significant challenge due to dynamic runtime status of servers, clients and the network environment. This paper proposes a queueing model for the cloud-based streaming service in which packet level dynamics are taken into consideration so that customer-affected performance can be estimated by a hybrid simulation approach. The simulation approach is particularly useful for cloud service providers to evaluate the service quality before launching the service. The analytical model has two parts: (1) the virtual-machine-level service queueing model along with the stationary closed-form expressions on the average number of customers, the average waiting time, and the average number of employed virtual machines (VMs), and (2) the microscopic model and the simulation procedure on the customer side that capture the lag time of streaming packets. The simulation procedure is derived based on the analytical model. The simulation results show how the service quality is affected by server and customer performances, providing the insight for cloud resource provision and client parameter settings.

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