Proactive planning of bandwidth resource using simulation-based what-if predictions for Web services in the cloud

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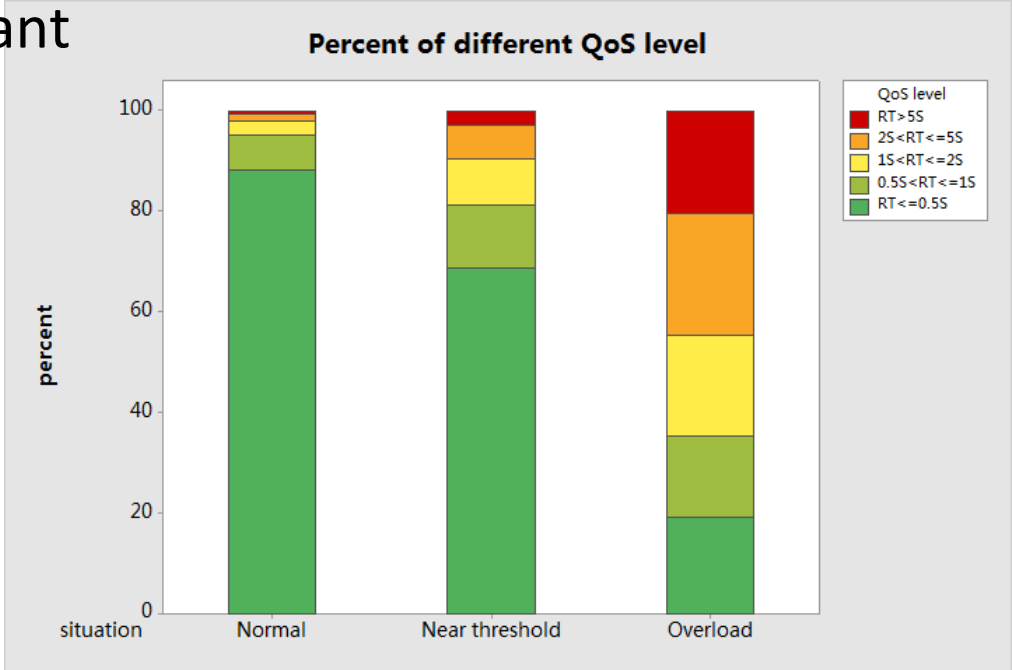
Problems & Ideas

- Resource planning is an important and timely problem for cloud users. Under-provisioning of bandwidth causes SLA violation and QoS dropping.
- challenges in predicting the network throughput and QoS:
  - diverse and complex response
  - evolving web services
  - complex network transportation

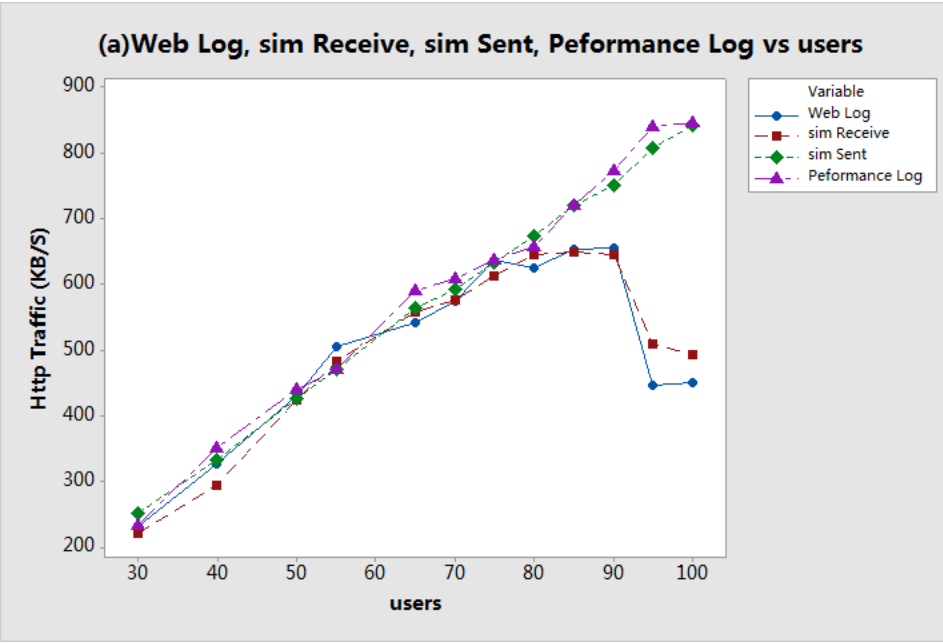


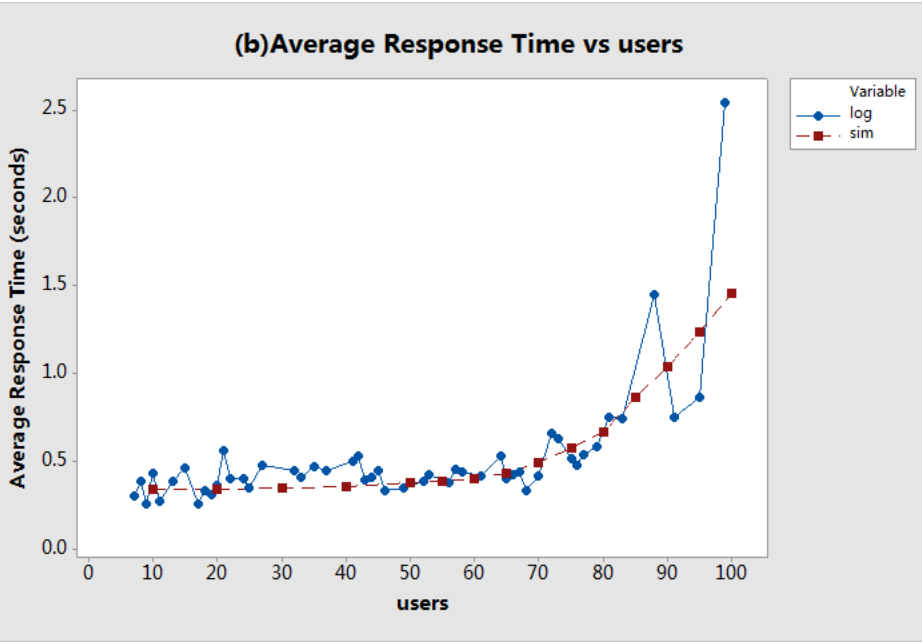
QoS level in different situations

- Ideas: Log2Sim: simulation based what-if analysis of web services
  - a lightweight workload model to describe user behavior
  - automated mining approach to obtain characteristics of workloads and responses from logs
  - traffic-aware simulations to predict the impact on the bandwidth consumption and the response time in changing contexts

Main Contributions

Log2Sim has good performance in the prediction of bandwidth consumption. The average relative error is 2% for the benchmark and 8% for the real-life system. As for the response time, Log2Sim cannot produce accurate predictions for every single service request, but the simulation results always show similar trends on average response time with the increase of workloads in different changing contexts. It can provide sufficient information for the system administrator in proactive bandwidth planning.





- **Predicting the impact on bandwidth consumption and average RT with a real-life web system**