Datacenter Traffic Monitoring Using Traffic Mirroring of Virtual Switch

Jae Yoon Chung¹, Jonghwan Hyun¹, James Won-Ki Hong¹,², and Raouf Boutaba²,³

¹ Department of Computer Science and Engineering, POSTECH, Pohang, Korea
² IT Convergence Engineering, POSTECH, Pohang, Korea
³ School of Computer Science, University of Waterloo, Canada

Introduction and Motivation

In these days, datacenter traffic has been increased rapidly. Monitoring datacenter traffic is more difficult than conventional Internet traffic monitoring. To monitor interactions among thousands of nodes, location of monitoring point is one of research challenges.

- Importance of Datacenter Traffic Monitoring
  - Understanding network status
  - Charging tenants' cost
  - Optimizing performance

- Research Goals
  - Abstract network monitoring system from tenants
  - Provide packet-level traffic monitoring while minimizing overload of hypervisor

Analysis VM: To minimize overload of hypervisor, traffic analysis process is performed on Analysis VM which is allocated in user domain (DomU).

Traffic Mirroring: While hypervisor can access entire HW resources, a VM in user domain cannot access virtual HW allocated to the other VMs. To avoid computation on hypervisor for traffic analysis, we use traffic mirroring technique to forward traffic directing to VMs into Analyzer VM.

Evaluation

- Job Completion Time
  - Only 5% additional time is required until finishing Map-Reduce task.
  - To count words in 7.3 GB dataset, the job completion time of the baseline configuration and traffic monitoring configuration is 909 seconds and 949 seconds respectively.

- CPU Utilization

- Memory Utilization

Conclusion

- Summary
  - Proposed datacenter traffic monitoring methodology using traffic mirroring of virtual switch
  - Monitored VM-to-VM communication in datacenter
  - Packet-level traffic monitoring
  - Abstracted monitoring system from tenants

- Future Work
  - Aggregate traffic information of datacenter
  - Perform stress test and show robustness
  - Run system benchmark tool to measure the performance of the proposed datacenter traffic monitoring methodology