Data Center TCP - Reproducing Selected Results

CS 656 Research Paper

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ABSTRACT

Data centers supporting host a diverse range of heterogenous traffic with varying throughput and delay requirements. Transport layer protocols power data center traffic must be able to tolerate bursts of traffic, provide low latencies for time-sensitive traffic, all while maintaining high throughput for large data flows. Several modifications to the TCP protocol have been proposed to address shortcomings in conventional TCP congestion control algorithms, which relies on packet loss as a metric of network congestion. Data Center TCP, Incast TCP, Multipath TCP, and TCP BBR are discussed, and a replication of selected results related to DCTCP performance are presented.

1 TCP CONGESTION CONTROL

2 DATA CENTER TCP

Modern distributed cloud applications rely heavily on the *partition/aggregate* design pattern, in which an application is broken in into hierarchical layers and time-sensitive requests at higher layers are divided and delegated to workers in the lower layers. Workers perform some component of a task and return a result to an aggregator, which is combined with results from other workers and passed back up through the hierarchy.

Data center TCP (DCTCP) attempts to address the problem of latency in partition/aggregate traffic by reducing queue length without affecting throughput for large TCP flows.

2.1 Reproducing DCTCP Results

2.1.1 Method. DCTCP results were reproduced using the Mininet network emulator running on Ubuntu 12.04 with the DCTCP kernel patch.

2.1.2 Results.

2.1.3 Discussion.

3 TCP BBR

TCP BBR is a congestion control algorithm based on bottleneck bandwidth and round-trip propogation time.s

4 INCAST TCP

5 MULTIPATH TCP

6 CONCLUSIONS

REFERENCES

[1] Intel Corporation. 2016. Intel Software Guard Extensions. (2016). https://software.intel.com/en-us/sgx