Proactive Incast Congestion Control in a Datacenter Serving Web Applications

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IEEE INFOCOM, Honolulu, April 17, 2018

















- How Incast congestion degrades performance
- Previous work
- Main design of PICC (Proactive Incast Congestion Control)
- Evaluation of PICC in real implementation



















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- 1. Before reallocate popular data files, check the storage and network utilization.
- 2. Periodically run PICC algorithm to re-select the popular data files.
- 3. If the existing gathering server is highly utilized, a new gathering server will be selected.



















Could we make it better?























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Experiment settings

1. 150 data servers in a typical fat-tree structure.

2. 10Gbps bandwidth.

3. Yahoo! Cloud Serving benchmark [3]

Comparison methods:

Baseline, Sliding window (TSW), ICTCP

[3] B. F. Cooper, A. Silberstein, E. Tam, and R. Ramakrishnan. Benchmarking cloud serving systems with ycsb. In Proc. of SOCC, 2010.

















1. Inter-rack packets transmission

2. Transmission efficiency ($\frac{\text{Size}}{\text{Latency}}$ /Bandwidth)

3. Overhead, algorithm computing time

4. Number of gathering servers



Summary

1. Incast congestion causes performance degradation greatly.

2. We propose PICC (Proactive Incast Congestion Control)

- 1. Popular data objects gathering
- 2. Correlated data objects clustering
- 3. Queuing delay reduction

3. Real Implementation shows PICC achieves much lower latency than previous methods.



Thank you!

