GreenDataFlow: Minimizing the Energy Footprint of Global Data Movement

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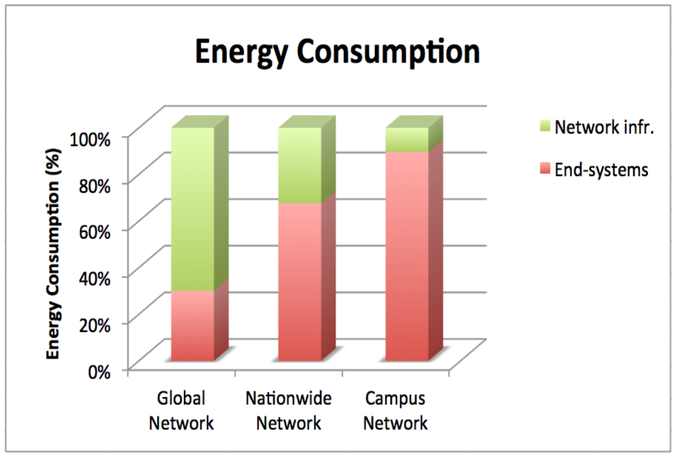
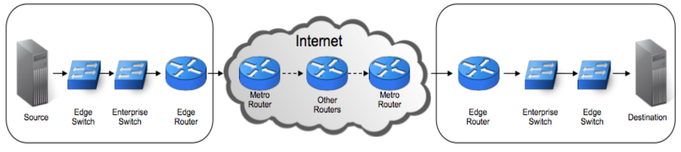
Background:

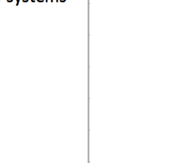
- **1+ Zettabytes** of data is moved globally in a year;
- Consumes **200 Terawatt hours** of electricity, costing **40 billion Dollars** per year.





Goal:

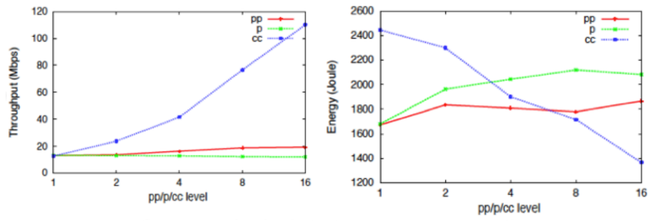
- **Minimize energy consumption** during data movement through **application-level tuning** and optimization at the end systems.

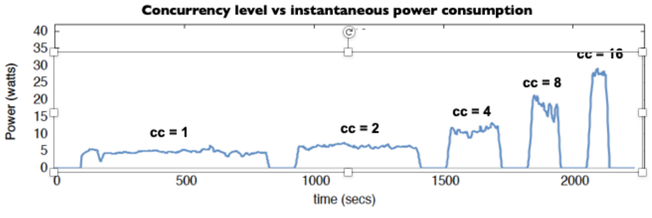


Method:

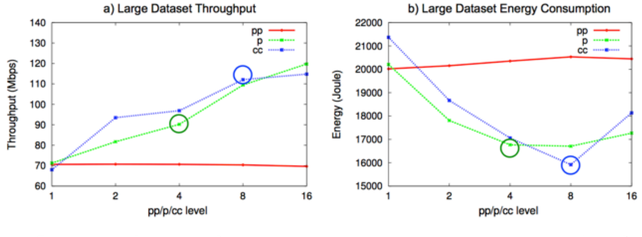
- **Offline historical data analysis** followed by **online dynamic tuning.**

How do we save energy?

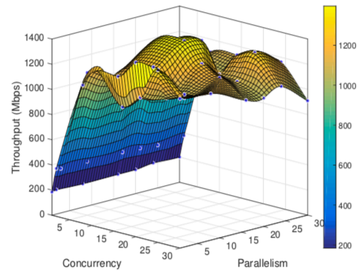




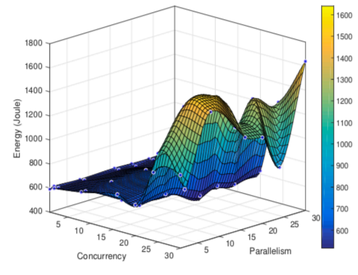
Not That Simple..



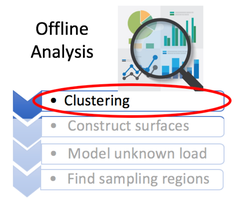
- Server and network components are not energy proportional
- Need to find find the break points for this nice balance, and use this fact to our advantage in end-to-end energy-efficient throughput optimization.

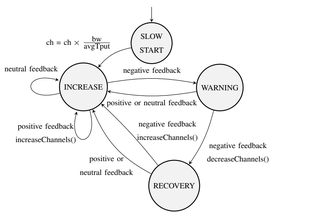


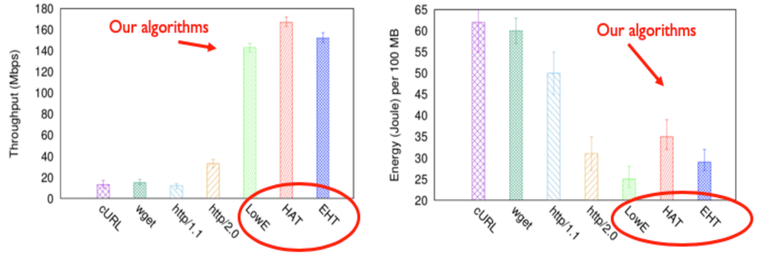
(a) Achieved Throughput for different *cc* and *p*



(b) Energy Consumption for different *cc* and *p*





Application Areas:

- Bulk data replication, cloud-hosted web services, mobile/IoT data transfers