Eliminating the Bandwidth Bottleneck of Central Query Dispatching Through TCP Connection Hand-Over

Query Dispatching

In scale-out databases, client queries must be routed to individual backend servers for processing.

Direct Communication

++ Latency
- Requires smart clients or static backends

Central Dispatcher

++ Simple clients / unaware of backends
- Bandwidth limited by dispatcher

Central Dispatching Implementations

Prism
- TCP connection hand-over
- Using a reprogrammable switch

(Hyrise) Dispatcher
- Purpose-built load-balancer
- Two separate TCP connections: client <-> dispatcher <-> database

HAProxy
- Off-the-shelf load-balancer
- Similar design as Hyrise dispatcher

Use Case and Research Focus: Partial Replication

<table>
<thead>
<tr>
<th>Payload</th>
<th>Throughput [Gb/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1B</td>
<td>1.25</td>
</tr>
<tr>
<td>32B</td>
<td>2.5</td>
</tr>
<tr>
<td>1KiB</td>
<td>5</td>
</tr>
<tr>
<td>32KiB</td>
<td>10</td>
</tr>
<tr>
<td>1MiB</td>
<td>20</td>
</tr>
<tr>
<td>32MiB</td>
<td>40</td>
</tr>
</tbody>
</table>

Dispatcher throughputs for varying payloads with two clients and two backends using 10G and 40G Ethernet.