FaaSTCC: Efficient transactional causal consistency for serverless computing

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1. Motivation

- **Function-as-a-Service (FaaS)** provides high scalability to applications by disaggregating computation from storage;
- Disaggregation imposes functions to be stateless, requiring constant contact with the storage layer, increasing latency response times;
- Caches may be added to the computational layer, but achieving consistency along multiple caches is not trivial.

2. Cache Consistency

- Different caches may have inconsistent versions, leading to inconsistent results for DAGs that spread multiple caches;
- Caches must coordinate to read from the same, consistent snapshot;

![Cache Diagram]

3. Promises

- Promises set an horizon on the cached versions where the values are still consistent, allowing for consistency validation of values given a snapshot;
- However, choosing transaction snapshots early may lead to cache underutilization;

<table>
<thead>
<tr>
<th>Cache</th>
<th>Key</th>
<th>Value</th>
<th>Version</th>
<th>Promise</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
<td>500</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>600</td>
<td>20</td>
<td>60</td>
</tr>
</tbody>
</table>

4. Snapshot Intervals

- Instead of choosing a snapshot at transaction start, clients discover the interval of consistent values for the transaction;

![Snapshot Interval Diagram]

5. Experimental results

![Latency Graph]

FaaSTCC provides 5x better performance than state-of-the-art

Both Promises and Snapshot Intervals are key for optimal performance

6. Acknowledgments

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