Incremental View Maintenance over Array Data
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Shared-Nothing Architecture

Analytical Cost Model

Query Integration

Experiments

PTF Catalog: PTF[time=1,153064;ra=1,100000;dec=1,50000] 1 billion objects, 343 GB
LinkedGeoData: GEO[long=1,100000;lat=1,50000] 30 million objects, 1 GB
View maintenance time:

Average optimization time per update batch:

Array View

Differential View Computation

View Chunk Reassignment

Array Chunk Reassignment

Optimal View Maintenance

Array chunk (view chunk) reassignment – ensures that we do not get stuck with an unfavorable static chunking strategy.
Incoming chunks are not first assigned to a node based on a pre-determined chunking strategy.
Piggyback on the chunk replication incurred by view maintenance when computing the reassignment.
A window of past batch updates is considered to avoid frequent unstable reassignments.

Table:

<table>
<thead>
<tr>
<th>Server</th>
<th>ntwk</th>
<th>cpu</th>
<th>join result</th>
<th>server</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>32</td>
<td>36</td>
<td>X, Y, Z</td>
<td>V1</td>
</tr>
<tr>
<td>Y</td>
<td>36</td>
<td>30</td>
<td>X, Y, Z</td>
<td>V1</td>
</tr>
<tr>
<td>Z</td>
<td>30</td>
<td>35</td>
<td>X, Y, Z</td>
<td>V1</td>
</tr>
</tbody>
</table>

Graphs:

- Incremental View Maintenance
- Analytical Cost Model
- Differential View Computation
- View Chunk Reassignment
- Array Chunk Reassignment

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