Decentralized ICN-based Dataflow System Implementation

Laura Al Wardani, T M Rayhan Gias, Dirk Kutscher
ACM ICN-2021
ICN-based Dataflow System Features

- **Name-based access to computation results**
  - Location independence – no address namespace, no mappings
  - Named data objects instead of communication channels
  - ICN-idiomatic reuse of computation results by multiple consumers

- **Decentralized operation**
  - Data Set Synchronization (NDN Psync)
  - Scaling decision by upstream function
  - Every node can trigger scaling and maintain a global view of the available resources in the infrastructure

- **Joint optimization of network and compute/memory resources**
  - Receiver-driven
  - Windowing approach combined with input queue

**Dataflow Example**
ICN-based Dataflow System Design

Node 1

Node 2

Node 3

Node 4

Naming Scheme

<table>
<thead>
<tr>
<th>Data</th>
<th>ACKs</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>f1/item1</td>
<td>f2/A/item3</td>
<td>node1/5</td>
</tr>
<tr>
<td>f2/B/item24</td>
<td>f1/item12</td>
<td>Node2/42</td>
</tr>
</tbody>
</table>
Thank you
Details and Q&A are in the breakout room