Buffer-aware scheduling of modal radio graphs

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Buffer-Aware Scheduling for Modal Radio Graphs
Hrishikesh Salunkhe, Orlando Moreira and Kees van Berkel

1. Introduction

- Real-time streaming applications
  - Require timing correctness
  - Run continuously
  - Process infinite input stream

- Dataflow
  - Suitable to model real-time streaming applications

<table>
<thead>
<tr>
<th>Dataflow</th>
<th>Analytical properties</th>
<th>Expressiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static dataflow</td>
<td>Strong</td>
<td>Limited</td>
</tr>
<tr>
<td>Mode-controlled dataflow</td>
<td>Strong</td>
<td>Medium</td>
</tr>
<tr>
<td>Dynamic dataflow</td>
<td>Limited</td>
<td>Strong</td>
</tr>
</tbody>
</table>

2. Motivation

- Multi-processor without back-pressure

3. Buffer allocation

- Early production
- Late consumption

4. Data-dependent (dynamic) behavior

- Mode-Controlled Dataflow (MCDF)

5. Results

- Buffer sizes for systems without back-pressure

<table>
<thead>
<tr>
<th>LTE receiver</th>
<th>Buffer sizes (Kbytes)</th>
<th>Saving (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>575</td>
<td>-</td>
</tr>
<tr>
<td>Single-rate Dataflow</td>
<td>468</td>
<td>15</td>
</tr>
<tr>
<td>Mode-controlled Dataflow</td>
<td>433</td>
<td>25</td>
</tr>
</tbody>
</table>

6. Conclusion

- Early production and latest consumption → buffer overflow.
- MCDF model of an LTE receiver saves 11% versus SRDF model and 25% versus manual buffer sizes.

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