

## Buffer-aware scheduling of modal radio graphs

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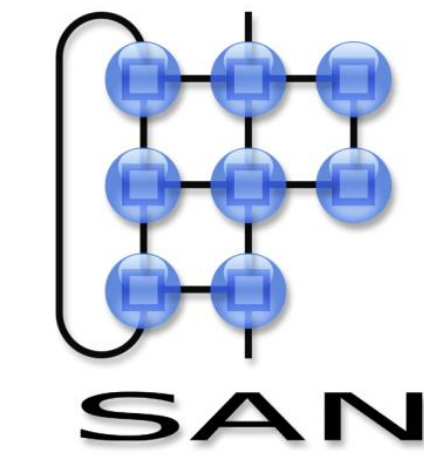
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# Buffer-Aware Scheduling for Modal Radio Graphs

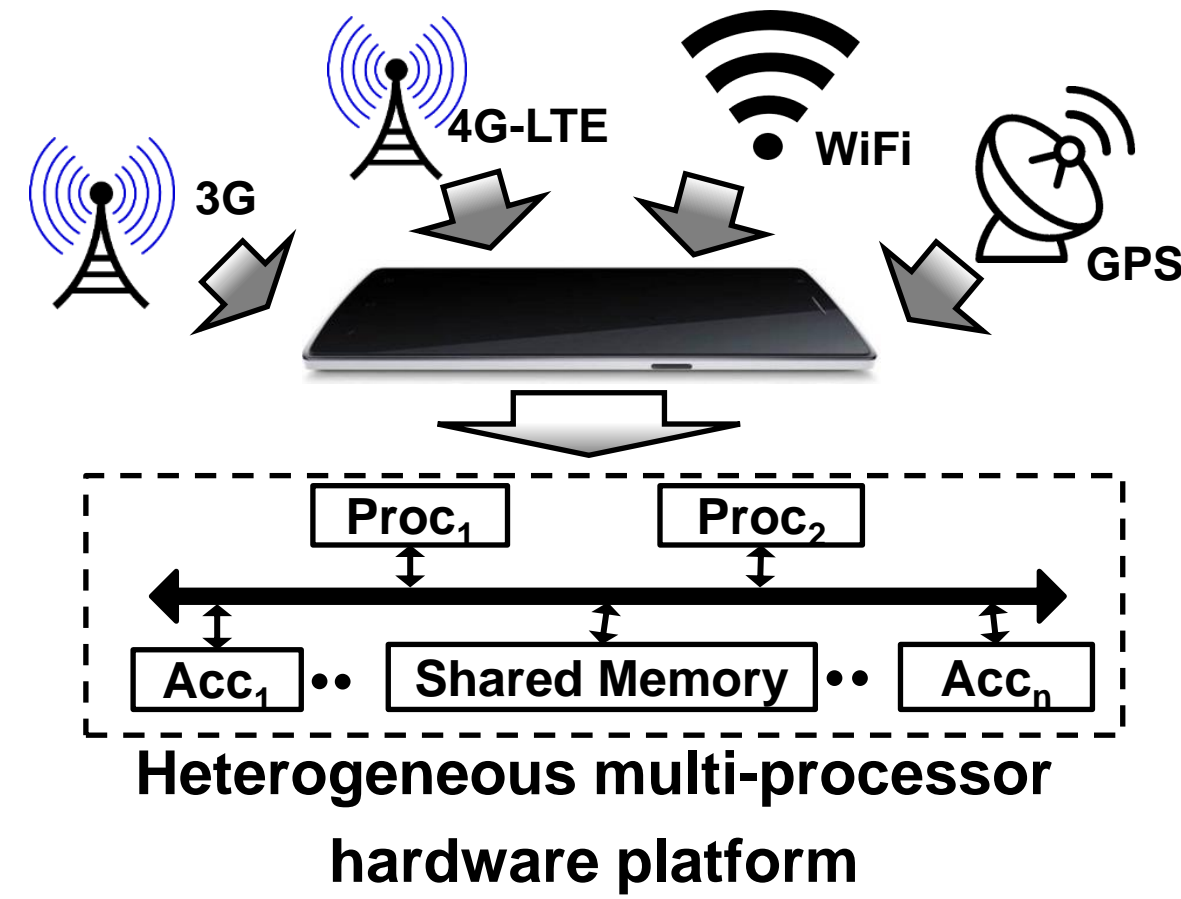
Hrishikesh Salunkhe, Orlando Moreira and Kees van Berkel



## 1. Introduction

### Real-time streaming applications

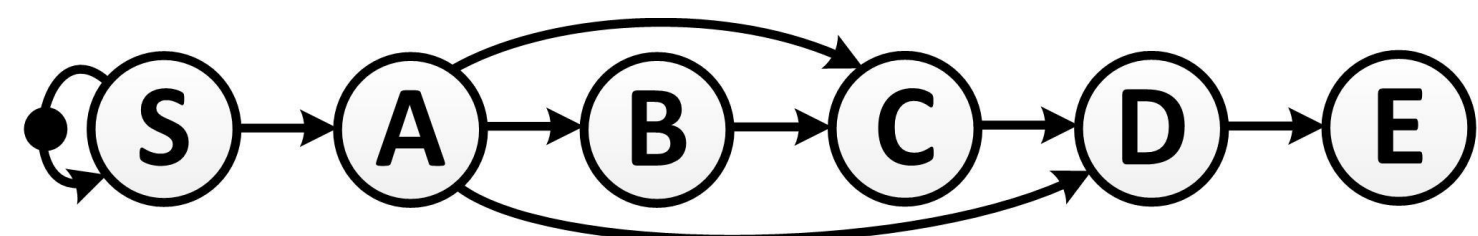
- Require timing correctness
- Run continuously
- Process infinite input stream



### Dataflow

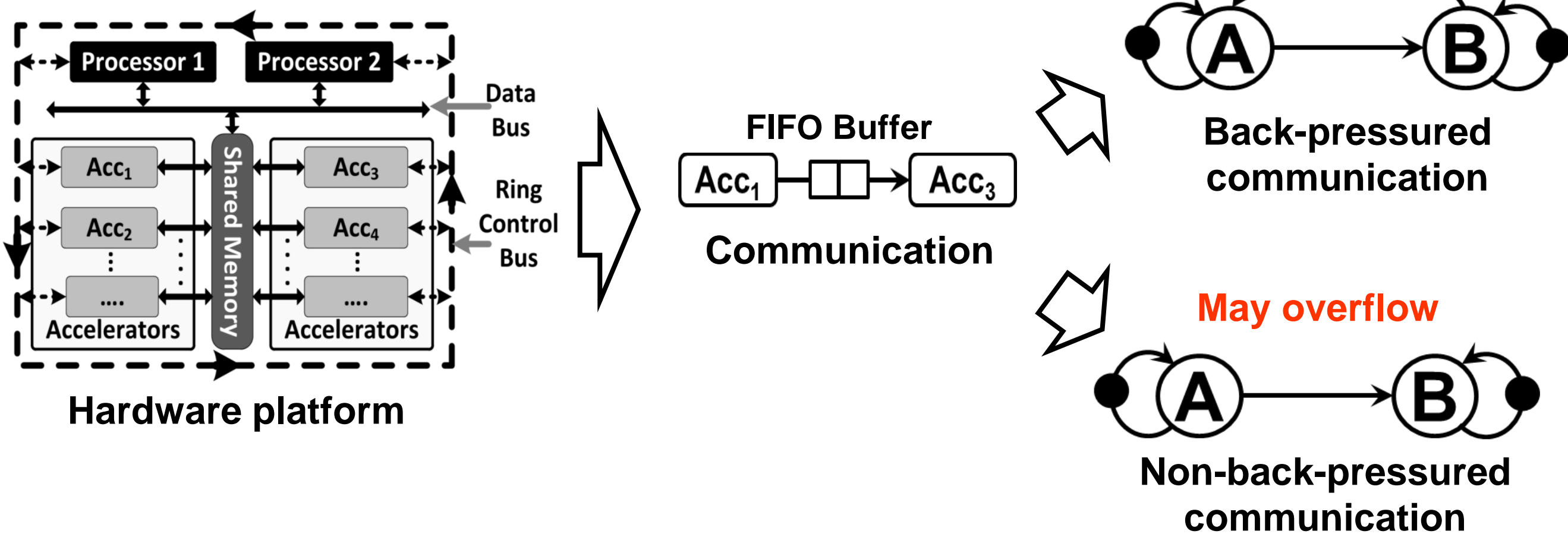
- Suitable to model real-time streaming applications

Dataflow	Analytical properties	Expressiveness
Static dataflow	Strong	Limited
Mode-controlled dataflow	Strong	Medium
Dynamic dataflow	Limited	Strong

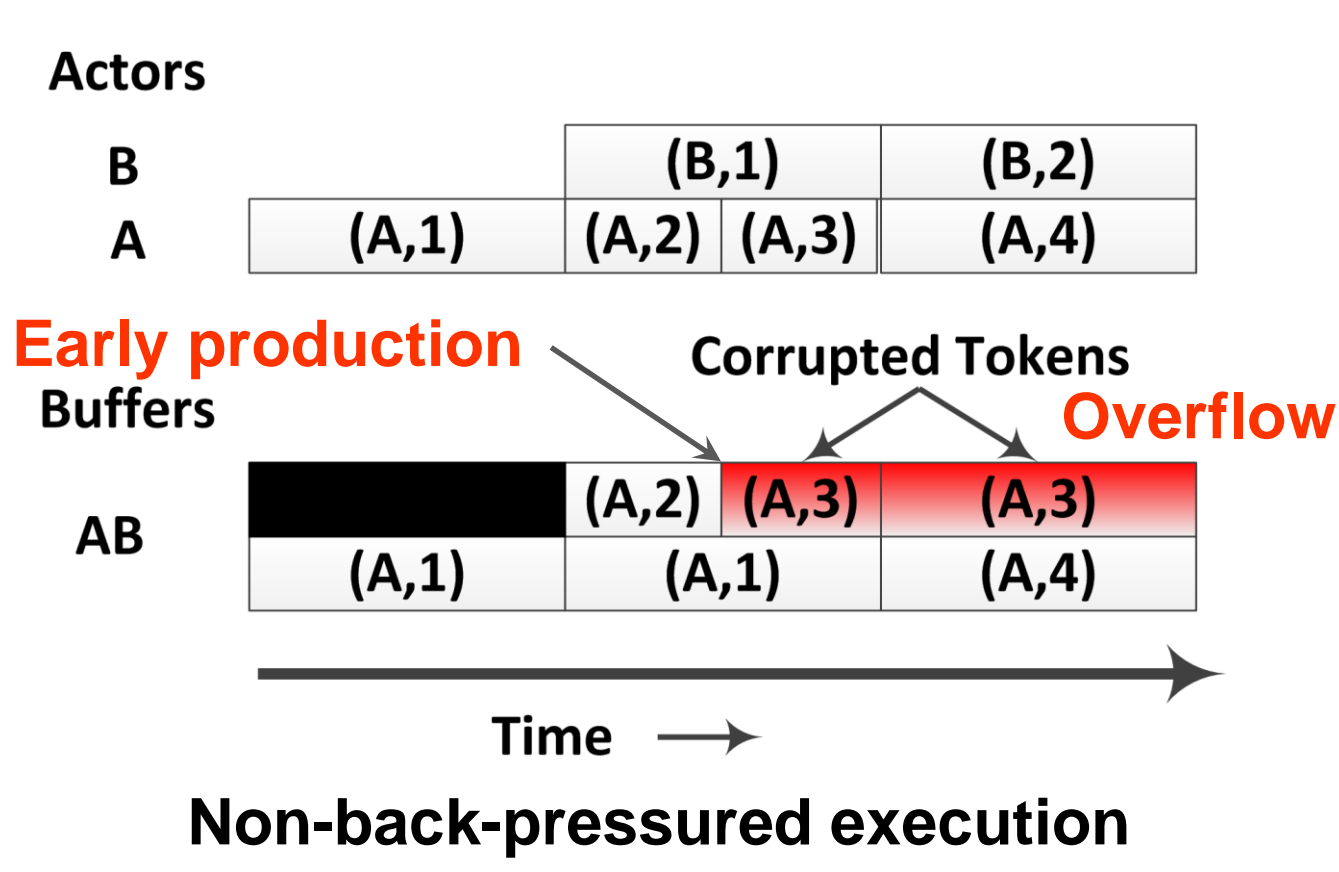
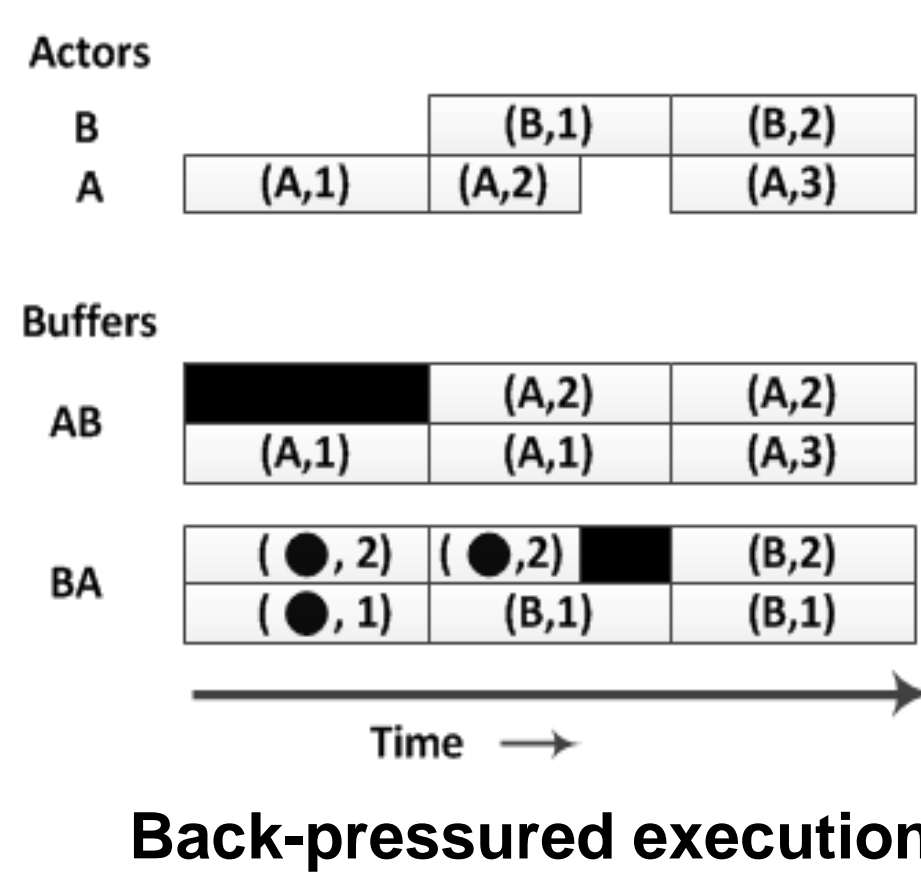


Static dataflow: Single-Rate Dataflow (SRDF) graph

### Multi-processor without back-pressure



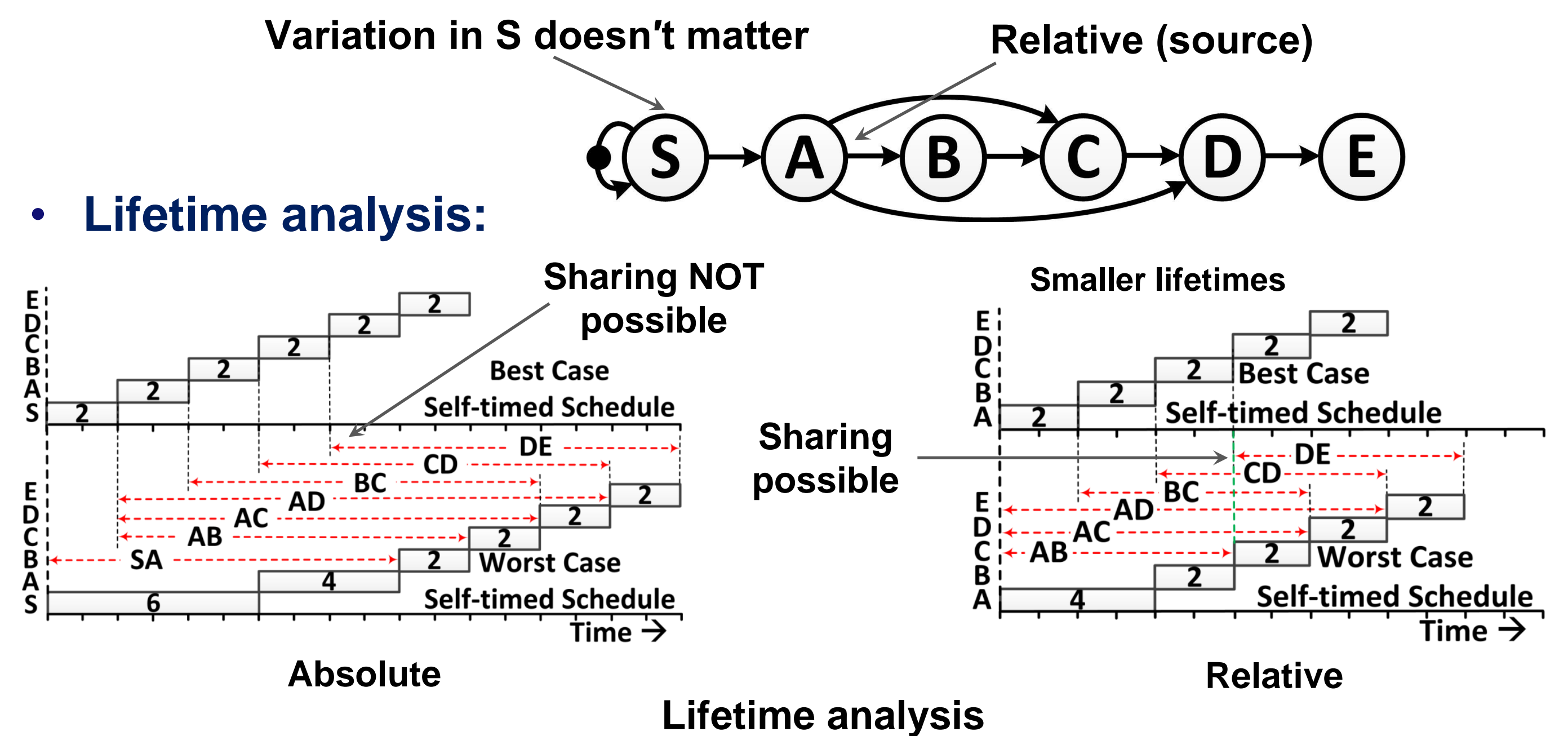
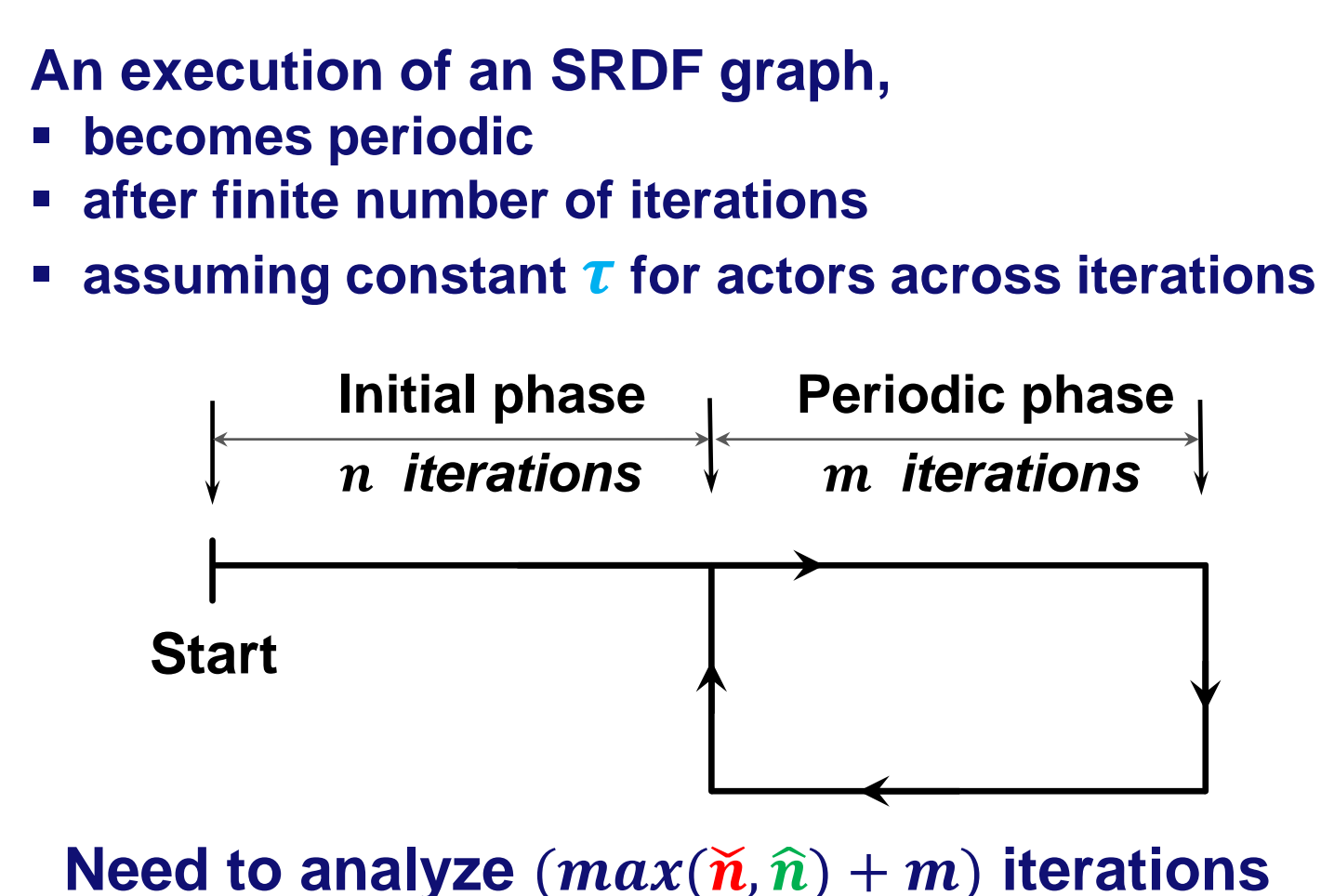
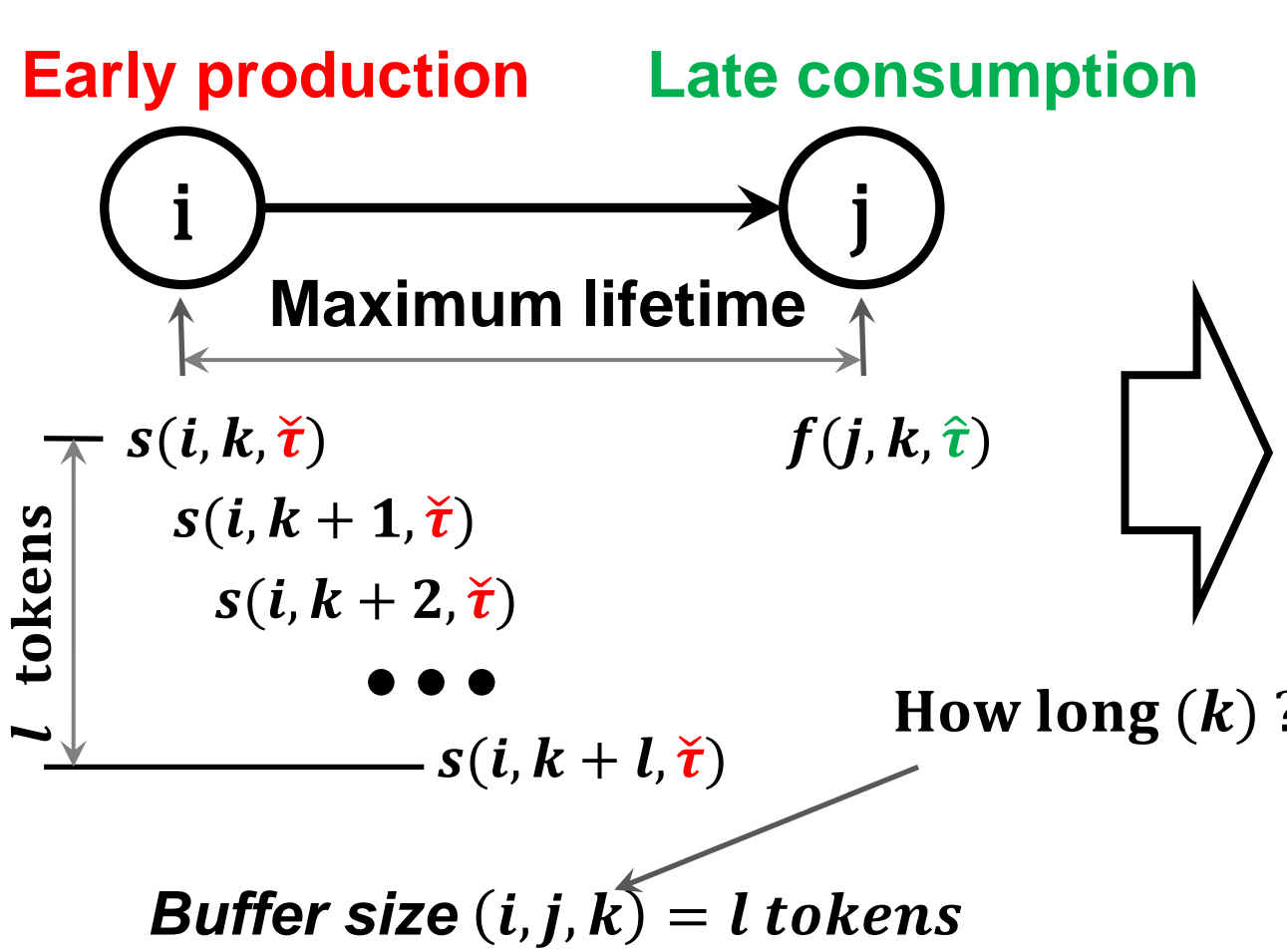
## 2. Motivation



Self-timed execution: varying execution time

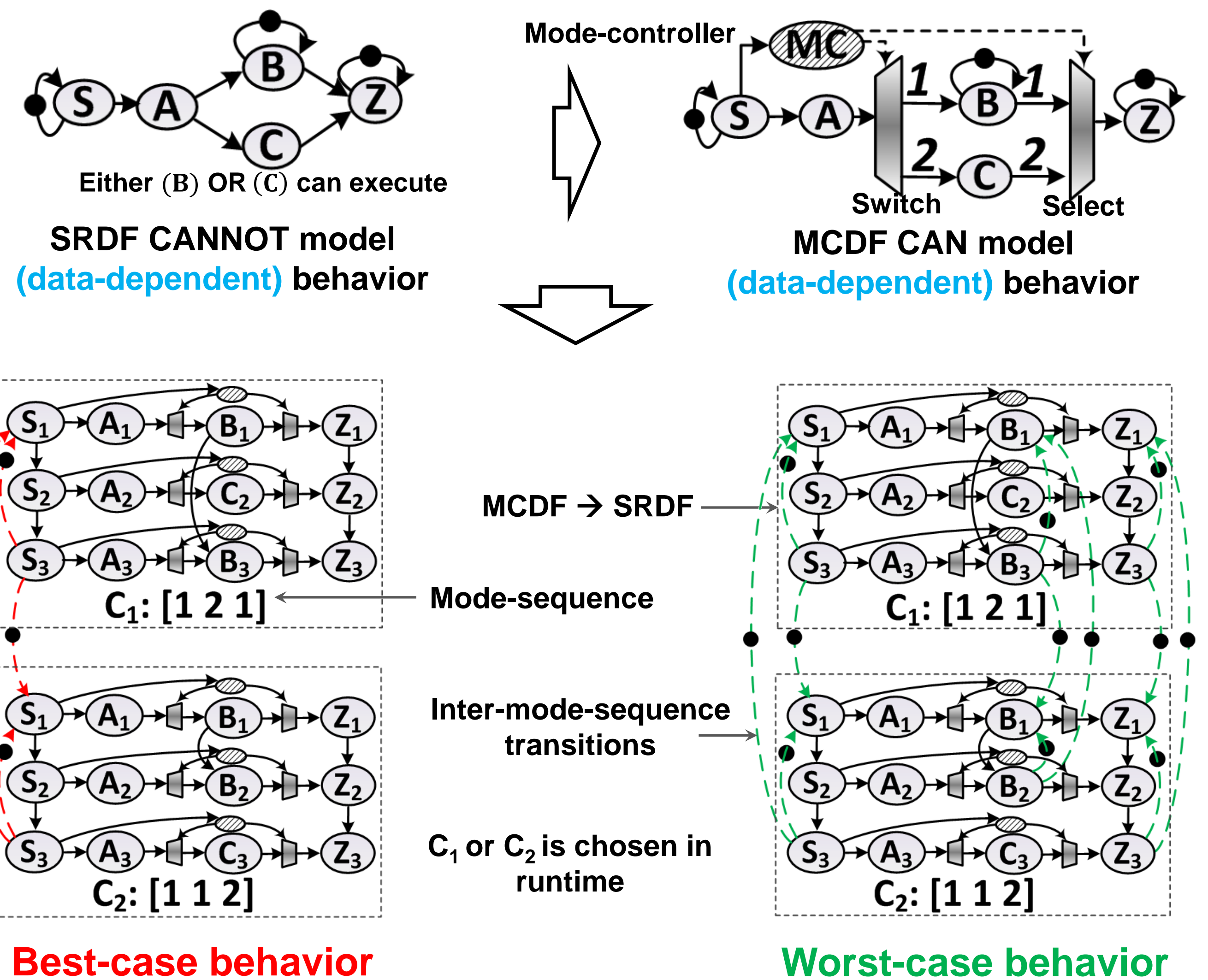
## 3. Buffer allocation

$s$ : Start time  $\checkmark$ : Best-case execution time  
 $k$ : Iteration number  $\hat{\tau}$ : Worst-case execution time



## 4. Data-dependent (dynamic) behavior

### Mode-Controlled Dataflow (MCDF)



## 5. Results

### Buffer sizes for systems without back-pressure

LTE receiver	Buffer sizes (Kbytes)	Saving (%)
Manual	575	-
Single-rate Dataflow	489	15
Mode-controlled Dataflow	433	25

## 6. Conclusion

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

## Contact

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