

Verified Time-Aware Stream Processing

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What is this PhD/Status seminar about?

- Distributed Systems
 - Stream processing frameworks
 - Dataflow models
 - Time-Aware Computations
- Formal Methods
 - Verification using proof assistants
 - Isabelle proofs
 - Verified and executable code
- Formalization of Time-Aware Stream Processing

- Introduction
- Preliminaries
- Lazy Lists Processors
- Time-Aware Operators
- Case Study
- Next Steps

Introduction

Dataflow Models

Preliminaries

- Datatypes
- Codatatypes
- Induction
- Coinduction

codatatype enat = EZero | ESucc enat

$$\begin{aligned}
 x \in \text{lset } lxs &\longrightarrow (\bigwedge x \ lxs. P \ x \ (\text{LCons } x \ lxs)) \longrightarrow \\
 (\bigwedge x \ lxs \ y. y \in \text{lset } lxs &\longrightarrow P \ y \ lxs \longrightarrow P \ y \ (\text{LCons } x \ lxs)) \longrightarrow \\
 P \ x \ lxs &
 \end{aligned}
 \tag{1}$$

Lazy Lists Processors

Operators

- Operator
- Produce produce
- Example

Sequential Composition

- Composition
- Skip n

Time-Aware Operators

Monotone and Productive Time-Aware Streams

- Monotone
- Productive

Building Blocks:

Case Study

Histogram

Efficient Histogram

- Foo

Next Steps

Questions, comments and suggestions