Stream-processing with purely-functional programming

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"StrIoT" is a purely-functional, distributed stream-processing system being built by researchers at Newcastle University to explore whether the advantages of the purely-functional programming paradigm apply to the design or operation of stream-processing systems (and related questions)

IoT poses some hard problems for the design and implemention of stream-processing systems. These range from efficiently managing the volume of information generated by sensors, to meeting non-functional requirements (e.g. maximising the battery life of low-powered processing nodes deployed in the field; or minimising the volume or rate of data transferred over a high-cost mobile data link) and the heterogeneity of the platforms on which the processing must take place (e.g. sensors with low-computational capabilites).

StrIoT addresses these challenges by having the user define the application using a restricted set of functional operators that have well-understood semantics. By applying a series of semantics-preserving rewrite rules to the graph, StrIoT searches for a set of transformations that best meets these non-functional requirements. The system then partitions the graph into a series of sub-graphs, for deployment on distributed processing nodes.

I will present an overview of StrIoT before drilling down into the graph rewriting and partitioning process, including:

- The representation of the stream-processing definition graph. We have chosen a novel approach for encoding Graphs which has some useful properties for reasoning, as well as some potential drawbacks.

- The systematic approach used to yield a set of graph rewrite rules from the chosen functional operators, as well as lessons learned about the semantic implications of the choice and design of the operators.

- An example illustrating the benefits of the approach.

The StrIoT implementation is available at: **<https://github.com/striot/striot>**
We have a discussion mailing list at **<https://lists.ncl.ac.uk/wws/info/striot>**