Project Goals
- To enable Dataflow and Complex Event Processing (CEP) on IoT devices
- Integrate Dataflow engine with Complex Event Processing (CEP)
- Merge Cloud and Internet Of Things Dataflow processing

Existing Architecture

Limitations:
- IoT devices send all data to the Cloud with no support of on-device execution
- No support for on-device execution
- Lacks strong integration between CEP and Dataflow engines
- IoT requires Dataflow and CEP engines tightly integrated

Implementation

Dataflow:
- User program is converted to Dataflow Graph (DAG)
- DAG Optimization groups tasks which can be run in parallel on same device/server
- Schedule the optimized tasks and deploy across the cluster
- Scheduler is implemented using Topological sort from graph processing
- Tasks deployed send periodic updates to the Controller
- Actor based concurrency models are used to achieve high scalability

Complex Event Processing:
- User submits a SQL query which is a combination of Dataflow and CEP
- Query Lexer tokenizes and parses the SQL query
- Performs optimizations such as optimal event pattern grouping
- Optimal event pattern grouping is performed using dynamic programming
- Query planner builds deployment plans
- Query deployment submits the tasks on to the nodes

Programming Abstraction

Dataflow Operators:
- SELECT Similar to database columns
- FROM Events composition using and, sequence, or and not
- WHERE Similar to database where
- WITHIN Temporal Operator for time windows
- LOCATED Spatial Operator necessary for IoT Applications
- ACTION Trigger another event or dataflow graph

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Results
- Implemented prototype applications such as Chinese remainder theorem and it took less than 2-3 seconds
- Tested application for large inputs such 200 bit integers for 10 modulo expressions

Future Work
- Work on deployment of Complex Event Processing queries
- Convert Dataflow to SQL similar to CEP
- For further information scan the QR Code