A model-driven approach for data-centric IoT applications

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Abstract. IoT data requires a formal modelling and implementation process to ease its integration, analysis and exploitation in Business Intelligence and Big Data systems. Consequently, we present STS4IoT in this work, a model-driven approach to design and develop data-centric IoT applications proposed in Plazas et al. (2022).

1 STS4IoT Proposal

The Internet of Things (IoT) has become a valuable data source for Business Intelligence (BI) and Big Data systems. It can collect, process and provide digital samples of relevant objects and phenomena in different spatial and temporal dimensions. BI and Big Data systems can exploit this data to extract valuable insights and improve decision-making (Saggi and Jain, 2018). However, IoT usually produces highly variable, heterogeneous and stream data that challenges traditional data analysis systems (Qin et al., 2016).

In this context, model-driven frameworks such as the Model-Driven Architecture (MDA) can define a standard design and implementation process for IoT data to ease its integration into BI and Big Data systems (Teixeira et al., 2017). Consequently, we proposed an MDA-based approach for modelling and developing data-centric IoT applications named STS4IoT (Plazas et al., 2022). STS4IoT models IoT systems in two abstraction levels separating the data requirements from the implementation choices and generating implementable code to provide the designed data.

STS4IoT considers three sets of concepts in its constructions:

1. **Data representation at sensor-level:** The *type of sensed variable* (*e.g.* temperature) since each variable has particular usage purposes and sources. The *temporal validity* of the data since new values are always sensed and transmitted. In this sense, the temporal validity depends on the *sensing* and *sending frequencies* . The *temporal transformations* that alter raw data (*e.g.* aggregations, conversions or filters) in a single sensor.