RESTful Sensor Web Enablement Services for Wireles Sensor Network

PRESENTED BY: Yipeng Zhou

Introduciton

- Today, the notion of the sensor web has been largely influenced by the concept of the Internet-Of-Things. It is considered as an infrastructure that enables to collect, model, store, retrieve, share, manipulate, analyze and visualize sensor data/metadata via the World Wide Web (WWW)
- Challenge
- How to address these challenges?

Overview

- 1 RESTful architecture for SWE
- 1)Representational State Transfer(REST)
- 2)Sensor Web Enablement
- 3)Adaptation of the SWE framework to the REST architectural style
- 2 Implementation and evaluation

1 Representational State Transfer

- REST is an architectural model for how distributed applications are built. Systems built around the REST architecture are said to be RESTful. REST builds on three concepts:
- Representation
- State
- Transfer

REST

- REST is an architectural model that can be efficiently implemented as a combination of the Hypertext Transfer Protocol (HTTP) and TCP/IP. With this instantiation of REST, HTTP requests are used to transfer representations of resources between clients and servers. Uniform Resource Identifiers (URIs) are used to encode transaction states.

Example

- The HTTP GET request sent by the server is shown as follows

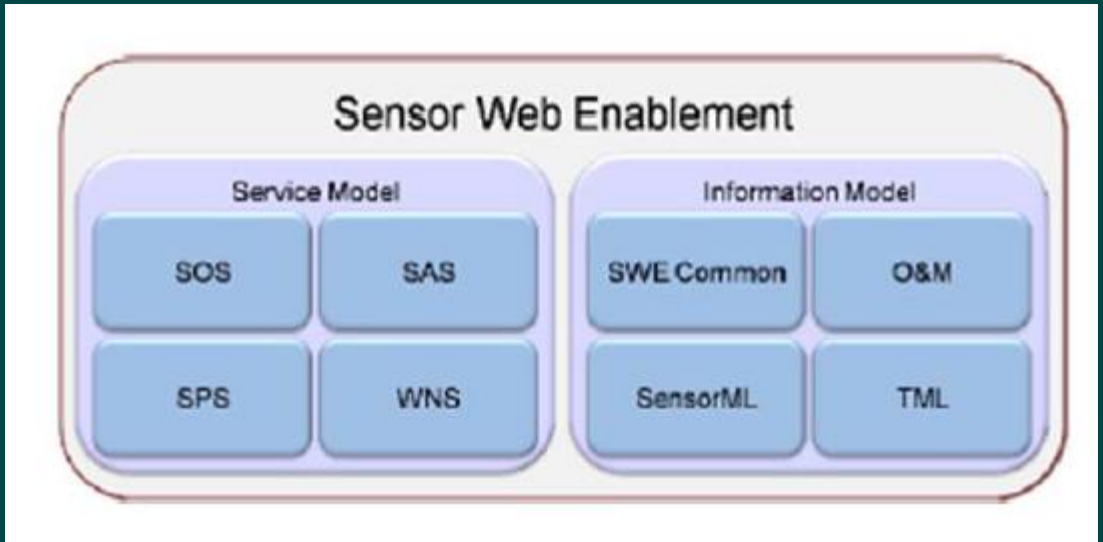
- GET /sensors/temperature HTTP/1.1
- Content-type: application/json

- The first line contains the HTTP GET verb, followed by the URI that represents the temperature sensor.
- The second line of the server's request contains the requested representation of the data that the client has to offer.

- HTTP/1.1 200 OK
- Content-type: application/json
- {"sensors":[{"name": "Temperature",
- “value": 26.1}]}
- The reply consists of two parts, the HTTP header and the HTTP body
- The first line contains the HTTP/1.1 keyword status code 200, *OK*
- The HTTP reply contains the same *Content-type header as the request*
- The HTTP body contains the JSON data that represent the current temperature as sensed by the smart object’s sensor

2 Sensor Web Enablement(SWE)

- The SWE framework consists of a set of standards that define data formats for sensor data and metadata and web service interfaces for providing sensor related functionality. As depicted in Figure



- the SWE framework can be divided into two parts: the *interface model defining the interfaces of* sensor related web service types and the *information model* comprising those standards which address the specification of data formats.

- *1) SWE Information model: The SWE information model* comprises a set of standards which define data models primarily for the encoding of sensor observations as well as sensor metadata.

SWE Information model:

Observatons & Measurements(O&M)

Sensor Model Language(SensorML)

Transducer Markup Language(TML)

- *2) SWE Interface Model: The SWE interface model comprises* standards that specify the interfaces of the different Sensor web services

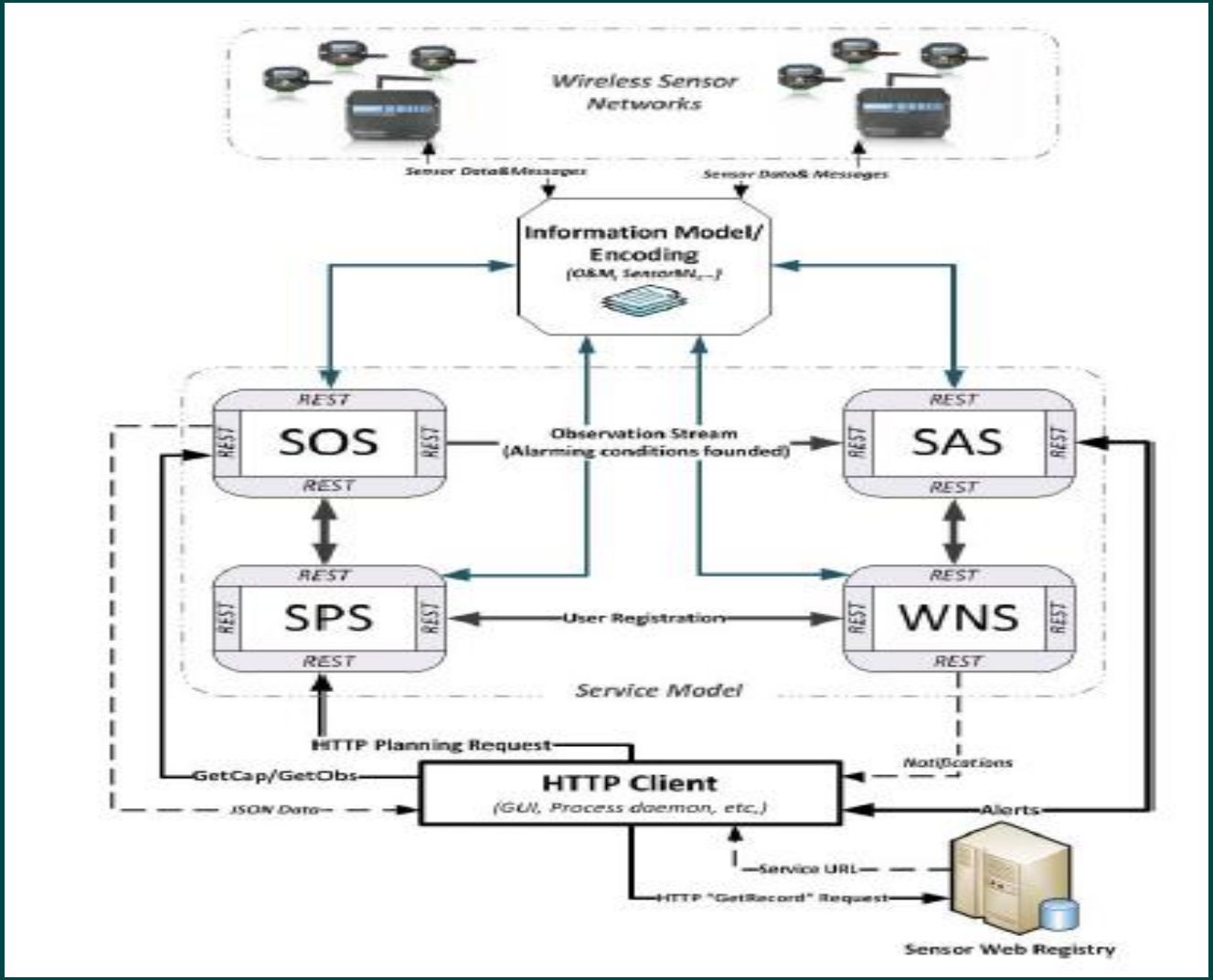
- Sensor Observation Service(SOS)

- Sensor Alert Service(SAS)

- Sensor Planning Srivice (SPS)

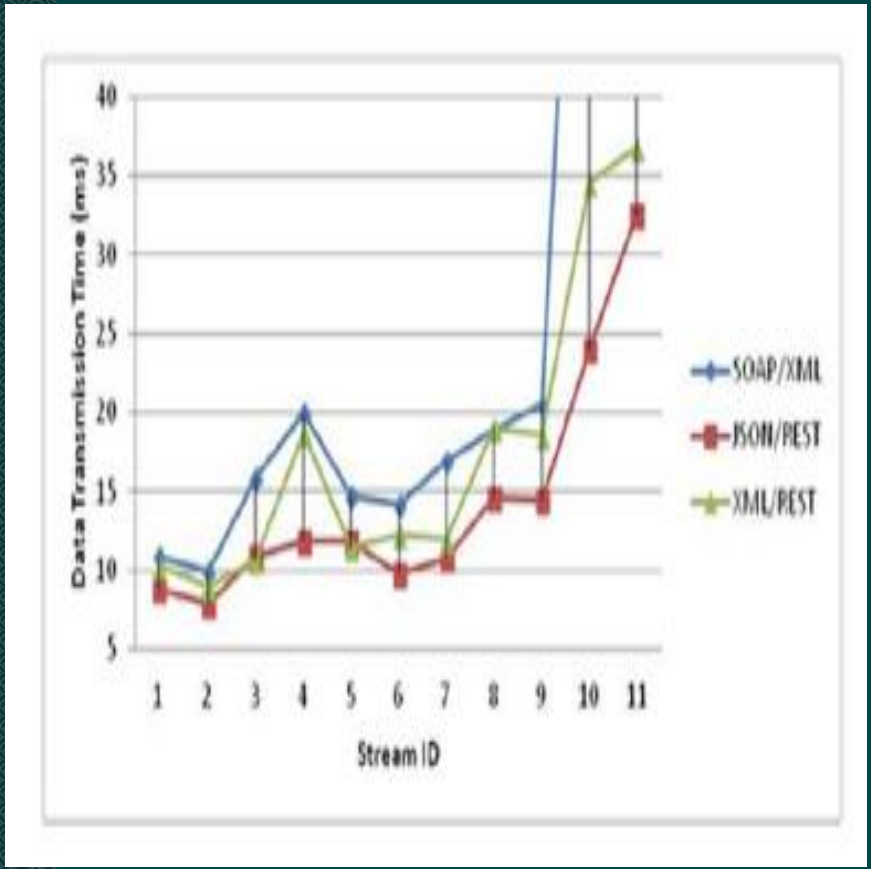
- Web Notification Service (WNS)

3 Adaptation of the SWE framwork to the REST architectural style

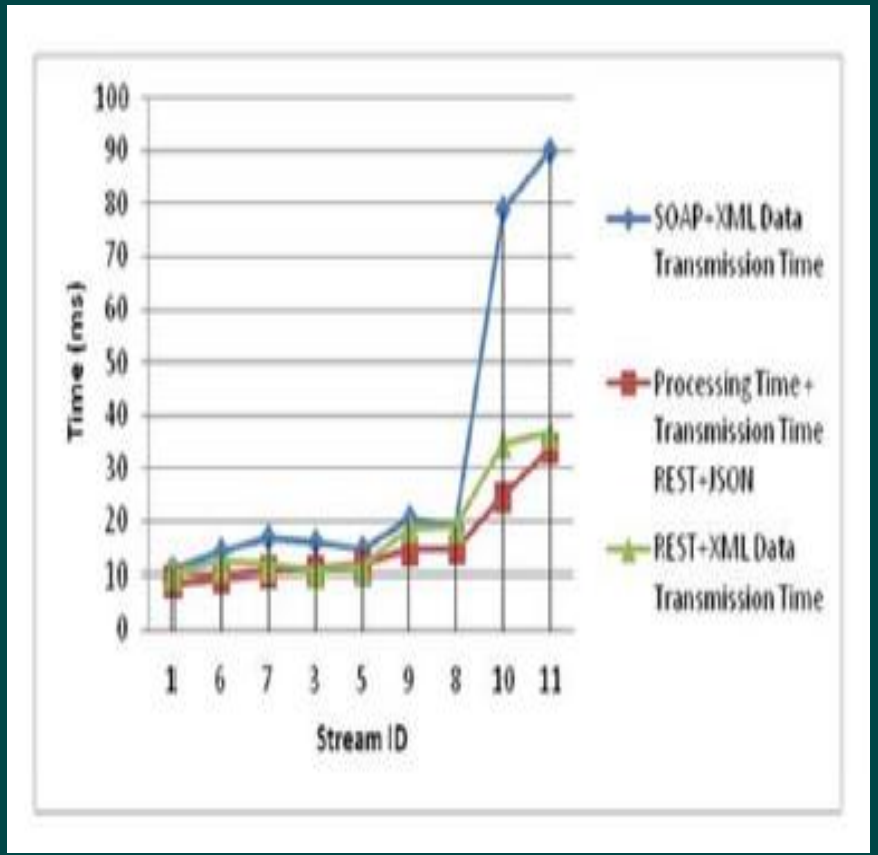


4 Evaluation

Data transmission duration HTTP/REST VS SOAP/XML VS XML/REST



SOAP/XML Transmission time VS REST/JSON Processing+Transmision time



5 Conclusion and Future work

- The performance evaluation results have showed the effectiveness of RESTful architecture as well as the efficiency of adopting the JSON format in terms of file size reduction and communication time.
- Several open challenges and future work in this context can be outlined:
- the improvement of interoperability, the facilitation of sensor and service integration, and the enablement of the Semantic Sensor Web.

- Thank you and question