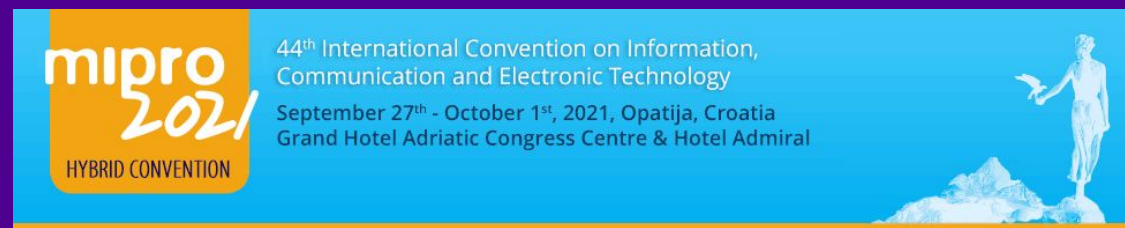


DataSites: a Simple Solution for Providing Building Data to Client Applications

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MIPRO 2021, September 27 - October 1, 2021



Software Engineering and Intelligent Systems SEIntS

- Research staff: approx. 15 persons
- Project volume: approx. 1 M€
- Scientific publications: approx. 25 per/year
- Close links between research, education and company collaboration

- Head of Research Group:



Jari Soini

D.Sc. (Tech.),
Research Manager

Tampere University
Faculty of Information Technology and
Communication Sciences

Research themes:

- ☐ Open software architectures and the interoperability of information systems
- ☐ Mobile applications, network technologies and the utilization of spatial data
- ☐ Web services and user interface techniques
- ☐ Embedded systems, sensor technologies and IoT (proof-of-concept and prototype development)
- ☐ Promotion of digitalization by utilizing various software technologies
- ☐ GreenICT and IT sustainability assessment

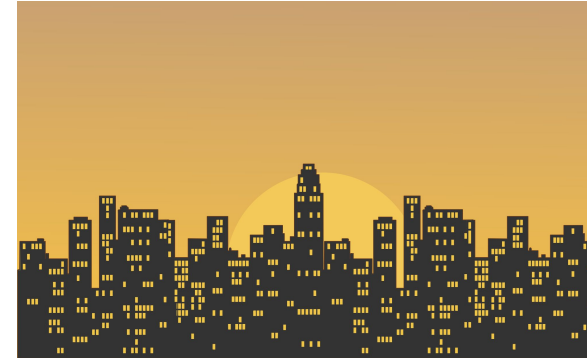
KIEMI project



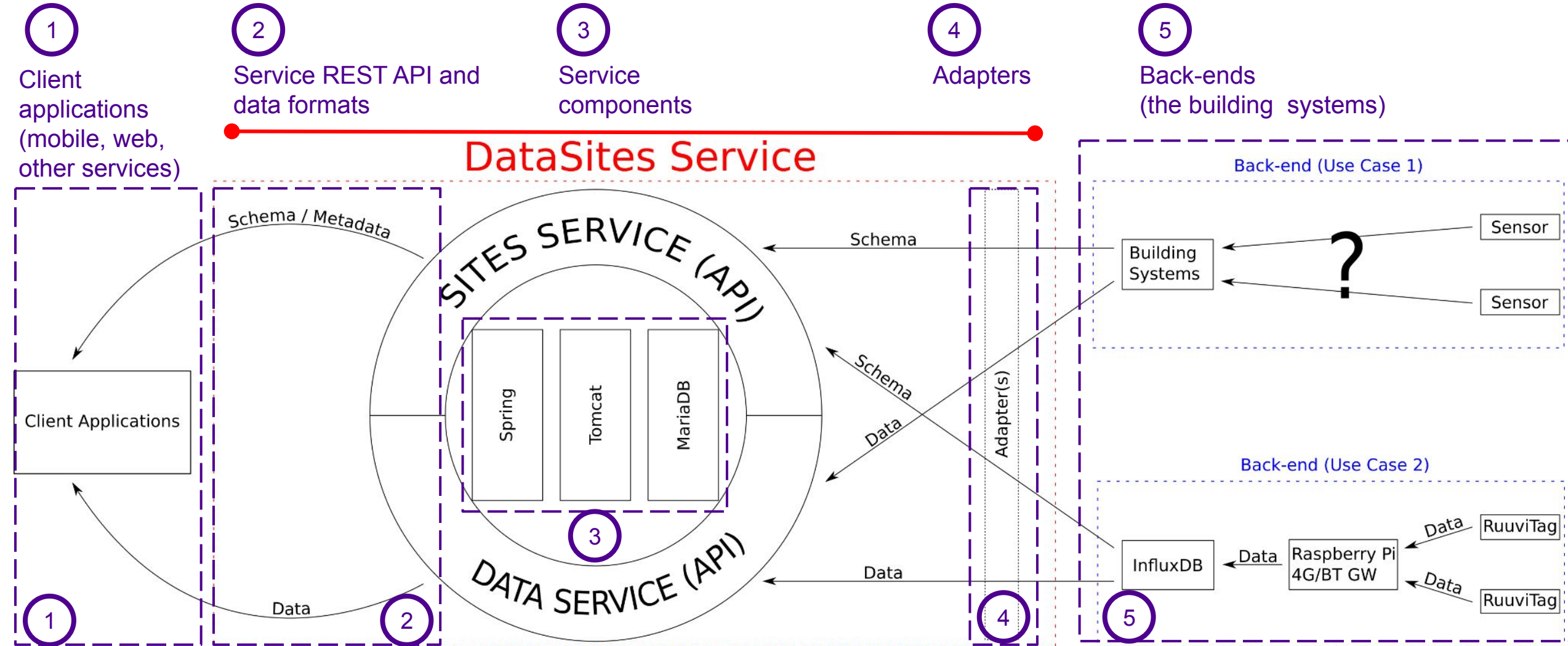
- our research was done as a part of **KIEMI project (Less is More - Toward an energy minimum for properties)**, funded by the European Regional Development Fund and the Regional Council of Satakunta
- in KIEMI we develop *proof-of-concept demonstrations* and *prototype applications* that illustrate how *cost-effective, open, and modular solutions* could be utilized to *improve the energy efficiency of existing, older buildings*
- important to maintain comfortable *living conditions*, find a balance

Overview of the DataSites service

- Motivation: to improve the energy efficiency of older buildings, we *must be able to access energy consumption data* from building systems and sensors
- When provided with this data, *residents and users* of buildings can make *informed choices on how to reduce energy consumption*
- To enable this we created the **DataSites service**, which includes:
 - a. *service components* and *adapters* to communicate with building systems, their interfaces and sensors (here called *back-ends*)
 - b. *REST APIs and data formats* for fetching data from **DataSites service** by *client applications*
- This paper discussed back-end systems, adapters, service components, and APIs, in the following presentation we will discuss the client application created for visualization of building data

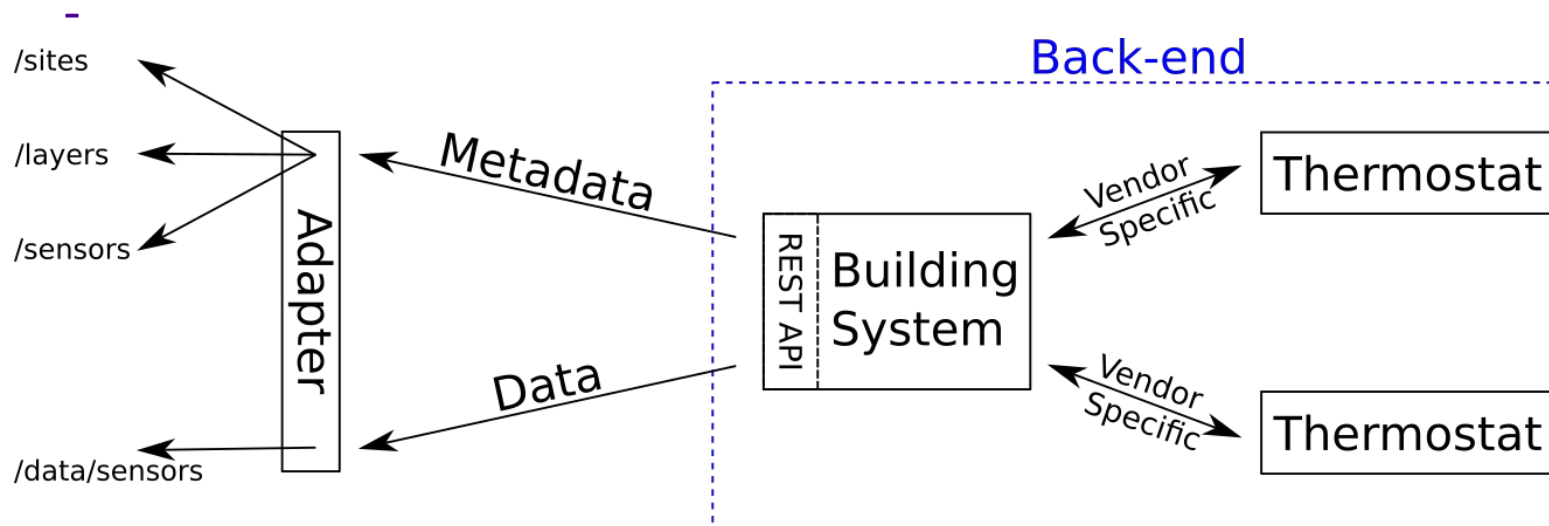


DataSites service: high-level architecture



Use case 1: Building Automation System

- Back-end building system *provides a cloud-based REST API* for its data
 - *To Sites service*: metadata of the building (address, name, location), node to layers based on their names
 - single site
 - *To Data service*: data from a modern building automation system: temperature , target temperature, data from each wireless thermostat (name, signal strength, battery level, ...)
 - data is fetched when DataSites receives a request from a client application

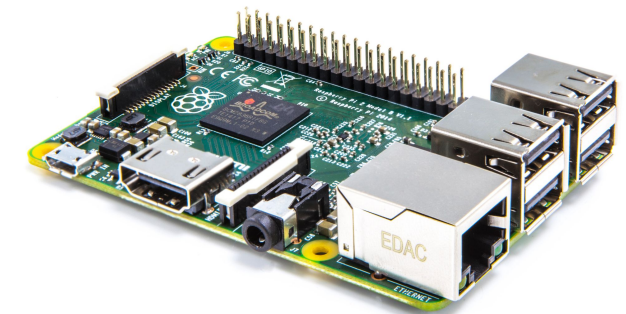


Use case 2: RuuviTag Data Collection

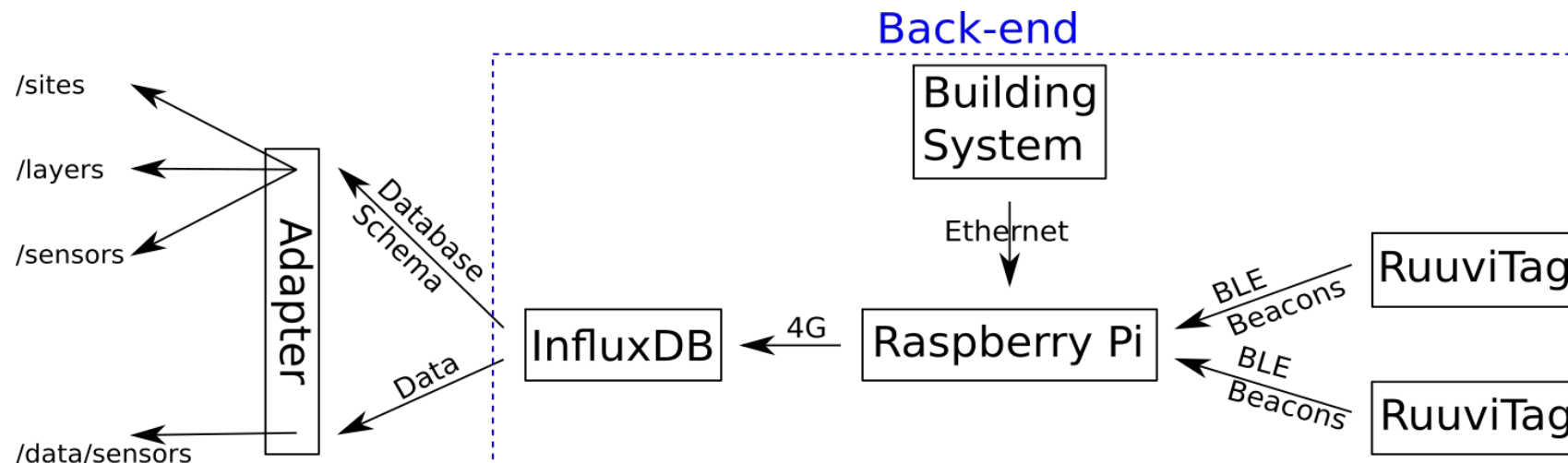
- installed a sensor system based on running on a Raspberry Pi and using 15 RuuviTag sensors (temperature, relative humidity, atmospheric pressure, accelerometer) to complement the existing building system
- *To Data service*: HVAC data from a building system through an Ethernet interface and a Web interface for history data
- *To Sites service*: no room layout data available, blueprint provided by the building owner



RuuviTag wireless sensor



Raspberry Pi single board computer



Possible future improvements

- hot loading of new adapters, without need for full system re-compilation and deployment
- usability improvements for setting sensor locations

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