Research Challenges for Energy Data Management (panel)

Torben Bach Pedersen
Aalborg University
tbp@cs.aau.dk

Wolfgang Lehner
TU Dresden
wolfgang.lehner@tu-dresden.de

ABSTRACT

This panel paper aims at initiating discussion at the Second International Workshop on Energy Data Management (EnDM 2013) about the important research challenges within Energy Data Management. The authors are the panel organizers, extra panelists will be recruited before the workshop.

Keywords

Energy Data Management, Architectures, Information Models

1. IMPORTANT CHALLENGES

Several challenges are important within energy data management for realizing the visions of the (truly) smart grid.

First, there is currently a lack of common definitions of data and information concepts within the area, e.g., community-wide agreed-upon standard ontologies specifying common concepts. Such standard information models and ontologies must be developed for key concepts within energy data management, such as the *flex-offer* concept [4] developed in the MIRABEL project [1].

Second, there is a lack of standardization of the units of the technical architecture within smart grid systems [3], e.g., which types of layers exist, and what the nodes at each layer does. Such standards already exist at the business level of the energy sector, e.g., for standardizing the different types of actors in smart grid setups, but not yet at the more technical levels. Such standard architectures must be developed in order to better leverage and unite the benefits of the many diverse systems currently being proposed.

Further challenges include optimized forecasting and prediction techniques, seamless integration of past, present and forecasted data [2], and developing scalable and robust data management techniques tailor-made for energy data management systems [1]. In this context, we see the domain of energy data management the driving force to build robust solutions combining data-intensive applications (classical analytical workloads on large datasets) and compute-intensive applications (simulations, numerical optimizations etc).

In more general terms, energy data management systems are a prime example of the massively distributed systems managing large amounts of data in real-time while operating vital societal infrastructures. Thus, techniques developed within energy data management will have further applications in other demanding application domains. This impact will embrace a variety of different areas in database and information systems research. For example, on the one side, domain-specific modeling techniques can be adapted to suit other application areas as well. On the other side, optimizations at the system architecture layer are required to deal with massive amounts of time series data and allow flexible aggregation and sampling techniques. Since time series are relevant for many other domains as well, the technological impact sparked by energy data management will help to push the envelope of sophisticated data management techniques in general. In the long term, we also consider the domain of energy data management as one of the most prominent use-case of cyber-physical systems (CPS, see, e.g., http://cyberphysicalsystems.org/) to seamlessly combine activities within the real and virtual world by an omnipresent monitoring and activity triggering mediation layer.

2. PANEL/WORKSHOP ORGANIZERS

Prof. Dr. Torben Bach Pedersen is full professor of computer science at Aalborg University, Denmark. He received his Ph.D. in 2000. His research interests span business intelligence topics such as data warehousing, multidimensional databases, OLAP, and data mining, with a focus on non-traditional and complex types of data. He has published more than 100 peer-reviewed papers on these topics. He has served as PC Chair for DaWaK 2009+10 and DOLAP 2010, General Chair for SSTD 2009, and on numerous program committees, including SIGMOD, VLDB, ICDE, and EDBT. He has worked on energy data management since 2007 and is currently involved in the MIRABEL EU FP7 project on energy data management, as well as the new large Danish TotalFlex project.

Prof. Dr.-Ing. Wolfgang Lehner is full professor and head of the database technology group at the Dresden University of Technology, Germany. He received his Ph.D. degree (Dr.-Ing.) in 1998. His research interests span data warehousing, data-intensive applications and processes in large distributed information systems, relational database

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engine support for data mining and forecast algorithms, approximate query processing (e.g. sampling) over very large data sets, and main-memory centric database architectures on modern hardware. He held a post doc position at IBM Almaden and has served as temporarily visiting scientist at Microsoft Research in Redmond (WA), at GfK Nuremberg, at SAP Walldorf, and at SAP Palo Alto. He published multiple text books and more than 150 reviewed research papers in conference proceedings and international journals. He has worked on energy data management since 2007 and is currently involved in the MIRABEL EU FP7 project on energy data management, as well as German initiatives.

3. REFERENCES

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