

Using Data Stream Management Systems to analyze Electric Power Consumption Data

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Abstract. With the development of AMM (Automatic Metering Management), it will be possible for electric power suppliers to acquire from the customers their electric power consumption up to every second. This will generate data arriving in multiple, continuous, rapid, and time-varying data streams. Data Stream Management Systems (DSMS) - currently available as prototypes - aim at facilitating the management of such data streams. This paper describes an experimental study which analyzes the advantages and limitations of using a DSMS for the management of electric power consumption data.

Keywords: Electric power consumption, Data Stream Management System, electric load curve, continuous queries.

1 Introduction and motivation

The forthcoming deployment of AMM (Automatic Metering Management) infrastructures in Europe will enable a more accurate observation of a large number of customers. Electric power consumption will be possibly measured at a rate up to one index per second. These measures are useful for operations such as billing, data aggregation and consumption control. A traditional database system (DBMS Data Base Management System) could be used to manage this information. However, methods used currently in DBMS are not adapted to data generated from AMM in a streaming way. AMM generates an overwhelming amount of data arriving in multiple, continuous, rapid, and time-varying data streams. Several Data Stream Management Systems (DSMS) have been developed these last years to meet these needs. The role of these systems is to process in real time one or more data streams using *continuous* queries.

We performed an experimental study, on two public domain and general purpose DSMS prototypes (STREAM and TelegraphCQ), to analyze the advantages and limits of using such a system. Some typical queries of electric power consumption analysis were defined: experiments and results are reported in this paper.

The paper is organized as follows. Section 2 gives a brief introduction to DSMS's in general and presents in particular STREAM and TelegraphCQ. Section 3 presents the experimental study, and results are reported in Section 4. In Section 5, we conclude this paper and give an outlook to our ongoing and future research in this area.

2 Data Stream management Systems

Data Stream Management Systems [3] are designed to perform continuous queries over data stream. Data elements arrive on-line and stay only for a limited time period in memory. In a DSMS, continuous queries evaluate continuously and incrementally arriving data elements. DSMS use windowing technics to handle some operations like aggregation as only an excerpt of a stream (window) is of interest at any given time. A window may be physically defined in terms of a time interval (for instance the last week), or logically defined in terms of the number of tuples (for example the last 20 elements).