ABSTRACT

With the management refinement of heating supply, the district heating system deploys a large number of meters or sensors to monitor and control the operating status of the heating network. It often needs to process real-time streaming data and coordinate the related enterprise business systems to make low-latency, intelligent decisions on the changes of heating network in time. Therefore, the automatic collection, on-demand dissemination and fusion of real-time sensing data play an increasingly important role in district heating systems. This article proposed an event-driven SOA based district heating system architecture with complex event processing capability, which can easily support the on-demand dissemination and aggregation of monitoring information and realize the event-driven service coordination cross different service domains. Finally, a deployed District Heating Control and Information Service System (DHCISS) in Beijing validates the effectiveness of our approach.

Keywords: Complex Event Processing (CEP), Cross-Domain Service Coordination, District Heating System, Event-Driven Architecture (EDA), Service-Oriented Architecture (SOA)

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INTRODUCTION

Energy consumption for heating purposes has attracted more and more attentions from governments, heat-supply enterprises and individual users. Therefore, the informatization and intelligent management of district heating industry has become increasingly important. However, with the management refinement of heating supply, the district heating system is gradually evolving from a simple remote-monitoring system to a large-scale complex composite service system, which collaboratively achieves the goal of automatic monitoring and intelligent management. The new metering-enabled district heating system deploys a large number of meters or sensors in the boiler, heat exchanger and subscriber household to accurately measure the operating status of the heating network as shown in Figure 1. Differently from the traditional heating system, the new metering-enabled district heating system can use various smart meters to accurately measure the amount of heat generated by the boiler and the heat consumed by customers. Through these meters deployed in the boiler, heat exchanger, heat pipes and subscriber household, the district heating system can automatically or semi-automatically adjust the heating policy to dynamically meet the users’ heating requirements. For example, the system can automatically make effective adjustment of the heating energy depending on the outside air temperature and consumer needs. This new system strengthens the refined management of heating and realizes the energy conservation. It can easily support the consumption-based billing rather than the heating space-based billing for households. With the refinement of heating supply, the information system becomes more and more complex. The monitoring data is not only used for the heating monitoring and control system, but also needed by other enterprise information systems like maintenance system, data analysis system, accounting system and

Figure 1. New district heating system
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