A Software Reference Architecture for Semantic-Aware Big Data Systems

Sergi Nadal, Victor Herrero, Oscar Romero, Alberto Abell, Xavier Franch, Stijn Vansummeren, Danilo Valerio

PII: S0950-5849(17)30428-7
DOI: 10.1016/j.infsof.2017.06.001
Reference: INFSOF 5835

To appear in: Information and Software Technology

Received date: 13 June 2016
Revised date: 22 May 2017
Accepted date: 2 June 2017


This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.
A Software Reference Architecture for Semantic-Aware Big Data Systems

Sergi Nadal*, Victor Herrero, Oscar Romero, Alberto Abelló, Xavier Franch, Stijn Vansummeren, Danilo Valerio

*Universitat Politècnica de Catalunya - BarcelonaTech
b Université Libre de Bruxelles
c Corporate Research and Technology, Siemens AG Österreich

Abstract

Context: Big Data systems are a class of software systems that ingest, store, process and serve massive amounts of heterogeneous data, from multiple sources. Despite their undisputed impact in current society, their engineering is still in its infancy and companies find it difficult to adopt them due to their inherent complexity. Existing attempts to provide architectural guidelines for their engineering fail to take into account important Big Data characteristics, such as the management, evolution and quality of the data.

Objective: In this paper, we follow software engineering principles to refine the λ-architecture, a reference model for Big Data systems, and use it as seed to create Bolster, a software reference architecture (SRA) for semantic-aware Big Data systems.

Method: By including a new layer into the λ-architecture, the Semantic Layer, Bolster is capable of handling the most representative Big Data characteristics (i.e., Volume, Velocity, Variety, Variability and Veracity).

Results: We present the successful implementation of Bolster in three industrial projects, involving five organizations. The validation results show high level of agreement among practitioners from all organizations with respect to standard quality factors.

Conclusion: As an SRA, Bolster allows organizations to design concrete architectures tailored to their specific needs. A distinguishing feature is that it provides semantic-awareness in Big Data Systems. These are Big Data system implementations that have components to simplify data definition and exploitation. In particular, they leverage metadata (i.e., data describing data) to enable (partial) automation of data exploitation and to aid the user in their...
دریافت فوری متن کامل مقاله

امکان دانلود نسخه تمام متن مقالات انگلیسی
امکان دانلود نسخه ترجمه شده مقالات
پذیرش سفارش ترجمه تخصصی
امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
امکان دانلود رایگان ۲ صفحه اول هر مقاله
امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
دانلود فوری مقاله پس از پرداخت آنلاین
پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات