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A note on an architecture for integrating cloud computing and enterprise systems using REA☆

Guido L. Geerts [a], Daniel E. O'Leary [b]

[a] University of Delaware, Newark, DE 19716, United States
[b] University of Southern California, Los Angeles, CA 90089-0441, United States

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ABSTRACT

This paper presents an architecture for integrating cloud computing and enterprise systems based on the Resource-Event-Agent (REA) model. The public/private approach used in RosettaNet provides the conceptual basis to capture information used in the cloud and by users of the cloud locally in their own systems. The architecture is then examined using information in the context of REA and the cloud-based software developed by Workday to illustrate different characteristics of the approach.

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1. Introduction

Cloud computing vendors create software to be used by their clients. One increasingly important use of such software as a service is for accounting and enterprise systems (e.g. Workday, NetSuite, and others). As part of system development, cloud vendors need to determine the extent of detail embedded in their systems. Too much or too little and the client base could be affected. If the software has too many information requirements then it will not likely be useful to smaller clients. However, if it does not have enough then it will not be useful to larger clients. A classic example is the extent of detail permitted in the chart of accounts and its ability to capture the underlying organization structure.

In addition, cloud vendors need to be able to allow clients to change the system but they have to keep the change within certain parameters or else those changes could limit the ability of the vendor to continue to generate system revisions and innovations, and potentially could result in a non-working system. As a result, such changes largely are limited to configuration. Accordingly, a concern of those vendors is their basic architecture, how their system integrates with their clients' other systems and processes and how clients change the system to meet their needs.

As a result, the purpose of this paper is to provide an architecture design for integrating cloud computing and enterprise systems, based on the Resource-Event-Agent (REA) model for accounting and enterprise systems applications. In particular, the purpose is to provide a cloud architecture that meets the minimum process and informational requirements for smaller or less complex user organizations, while still allowing larger more complex organizations robust enough information capture and processes so that they can add additional processes and data requirements over and above the base capabilities provided in the cloud model. The approach is based on separating processes into the equivalent of RosettaNet's "public" and "private" processes, where public processes provide some minimal required level of information, documents and workflow for all participants in the cloud.[1] However, private processes,

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E-mail addresses: Geerts@udel.edu (G.L. Geerts), Oleary@usc.edu (D.E. O'Leary).

[1] RosettaNet is a consortium of a number of firms specializing in information technology, electronic components, and semiconductor manufacturing that are working to create industry-wide e-business standards. Go to https://resources.gs1us.org/rosettanet for more information.

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generated by the cloud provider or developed independently by customers, can be included over and above public processes to provide clients additional private capabilities beyond cloud resources.

One of the first uses of the REA model was to illustrate event-driven accounting systems using relational databases as implementation platform (Gal and McCarthy, 1986; McCarthy, 1982). It has since been expanded to include efforts aimed at ontologies, value chains and other concerns (e.g., Geerts and McCarthy, 2000, 2006). The REA model likely is the most studied design science artifact in accounting information systems research (Geerts et al., 2013).

In this paper, minimum public processes for accounting and enterprise systems applications are set as being "REA — compliant" in order to meet application and theoretical requirements of accounting systems (e.g. Chen et al. (1994) and Dunn and McCarthy (1997)). As a result, a wide range of accounting and enterprise systems users could employ such a basic cloud-based system. In addition, using this approach, a consistent set of public information could be exchanged between firms and other interested parties using such information. Private process information can then be added to basic public information as required by participating enterprises or groups of enterprises. Private processes might be generated to accommodate particular industry specific issues at a company, additional variables, to facilitate some new technology (RFID) or other concerns. With this type of an architecture, cloud computing could present to users an overall set of publicly and privately available capabilities that could meet their most complex needs.

This paper proceeds as follows. Section 2 provides some background regarding the public and private workflow model associated with RosettaNet. Section 3 applies the public and private model to cloud computing. Section 4 examines the role of REA in both public and private processes, including an example to help illustrate key concepts associated with public and private processes. Section 5 analyzes some of the issues associated with public and private processes and reporting in a cloud environment. Section 6 uses Workday as a case study to illustrate some of the discussion regarding the use of the REA model as part of a cloud computing architecture, with information gathered from their comments on being a cloud-based accounting and enterprise system. Section 7 briefly summarizes the paper, examines some potential extensions and investigates the contributions.

2. Background — RosettaNet workflow: public and private processes

RosettaNet was developed as part of a set of efforts to facilitate business to business (B2B) e-business, also referred to as "digitization." The "RosettaNet Consortium" is an independent and nonprofit consortium of some of the major companies in information technology, electronic components, and semiconductor manufacturing. The RosettaNet efforts are designed to create and implement industry-wide, open e-business process standards that facilitate the electronic business interfaces used between participating supply chain partners.

In RosettaNet, "public" processes define information, documents and data flows that virtually all users must conform to as part of a particular process, for example, one firm ordering goods from another firm, while "private" processes provide specific information, documents and workflow for the user organization processes beyond the public process. This public/private approach promulgates providing processes and data that all firms employ specified as part of the "public" process, while still allowing additional data and processes for private use within participating firms. As a result, public processes are based on providing the necessary information, however, public processes might not contain sufficient information for all participants.

Fig. 1 illustrates a RosettaNet flow of information based on public and private processes.

The information flow proceeds in the following manner:

1. A customer private process initiates a RosettaNet message. Data is retrieved and formatted into a RosettaNet message structure, and is forwarded to the public process that implements the customer role

The private process can generate more information than is required by the public process. The public process does not need to employ all of the information generated in the private process, but could include additional discretionary capabilities. The RosettaNet message generally requires only certain minimal data that meets the needs of the public process, e.g., data items in a particular document.

2. The public workflow process creates the appropriate RosettaNet message. The message is sent to the public process of the product supplier

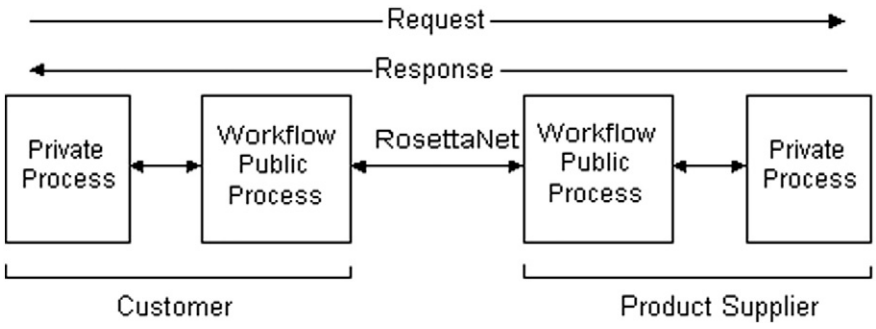

Fig. 1. RosettaNet Flow of Information. (https://docs.oracle.com/cd/E13214_01/wli/docs102/tpintro/rosettanet.html).

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