

# AIS Design based on Service - Oriented Architecture SOA

Yan-Fang Niu

**Abstract**—In view of current IT integration development of SOA, this paper examines AIS design based on SOA, including information sources collection, accounting business process integration and real-time financial reports. The main objective of this exploratory paper is to facilitate AIS research combing the Web Service, which is often ignored in accounting and computer research. It provides a conceptual framework that clarifies the interdependency between SOA and AIS, and also presents the major SOA functions in different areas of AIS.

**Keywords**—AIS, SOA, Web Service

## I. INTRODUCTION

IN 'now economy'<sup>1</sup>, organizations need an access to timely information to eliminate delays in business operations and make timely adjustments in accordance with environmental changes to obtain more competitive advantages. In this case it is much more necessary for organizations to construct inter-organizations information systems for real-time communication. With the development of IT integration, Service-Oriented Architecture (SOA) emerged and is becoming more maturity, which makes inter-organizations information systems integration much easier. Accounting Information System (AIS) is indispensable part of information systems. This article mainly introduces AIS design built on the platform of SOA. The content refers to how AIS achieves the collection of information sources, the accounting business process integration and real-time financial reports. Prior to this, the paper will make a brief introduction of SOA and its core service concept.

## II. A BRIEF INTRODUCTION OF SOA

SOA is a software architecture standard based on XML (Extensible Markup Language). It achieves the interconnection between information systems through Web services (specifically through SOAP, WSDL, UDDI, which are based on XML and used to describe the Web Services), without thinking the language and platform offering the services. So

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<sup>1</sup> In years to come, experts predict, many companies will use information technology to become a "real-time enterprise"—an organization that is able to react instantaneously to changes in its business. And as firms wire themselves up and connect to their business partners, they make the entire economy more and more real-time, slowly but surely creating not so much a 'new' but a 'now' economy." The Economist, February 1, 2002.

information systems built on SOA have the most loosing coupling characteristic structure. In SOA, Web service is the core concept. Terminology is used to package application program's functions of reusable components. Systems built on SOA use services as the basic unit to organize IT resources, and each of these services can complete specific events in the actual business processes, letting business flow transfer from an effective state to another state. Harvinder Kalsi, chief architect of Cisco Company in SOA / BPM department gave a vivid interpretation: "SOA is the business services ...to update new customers' pricing is a business service while to update a database record is not." So service is different from events in computer programming, which has an explicit meaning. Services can be encapsulated and constructed by many sub-services. According to the encapsulation degree, the service can be divided into coarse-grained services and fined-grained services. Coarse-grained services are applied for specific applications, which can find corresponding concepts and entities in real world, such as quotes, orders, etc. Fined-grained services are related to the concrete realization of services, which may be constructed by functions, objects, classes in software programming. Generally they can be divided into enterprise layer, process layer and infrastructure layer (as shown in Fig.1).

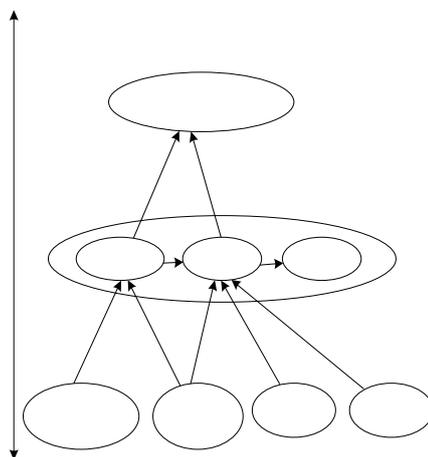


Fig. 1 Division of Services by grain in SOA

SOA is featured by encapsulation, interoperability and reusability, which has an important impact on AIS design. The

following illustration comes from the collection of information sources, the accounting business process integration and real-time financial reports.

### III. COLLECTION OF INFORMATION SOURCES

Sorter(1969) put forward events accounting and McCarthy (1982) proposed REA accounting model, both of which need AIS to collect the original, semantic information of business events into database rather than record the debit-credit entries which are only useful for balance sheets[1][2]. They are also called events-driven design method. The most important thing for event driven method, it is to define a lots of data views (also called rules) to meet for different accounting standards. That also means to validate the corresponding relationships between accounting entries and business events. And traditional accounting books, general ledgers and accounting statements are output data views too, not entity data tables in database any more.

The services of SOA can fully realize event-driven principle. In SOA, defining different data views among events can be considered to define different grained services, so it is also called service-driven design method. Different level services complete different layer events. The more fined-grained services, the more involved in how to realize the services, the most fined services are those classes, functions and objects in programming. As for accountants, they are demanded to take part in defining the middle grained coarse services. They need to identify event resources, participants and location; to distinguish characteristics and attributes relevant to events; to identify and record direct relations among resources, events, and locations; to identify the control mechanism of events; and to identify trigger mechanism of all events including trigger, triggering time, the response after triggering, etc. When these rules are defined, IT staffs can use different grained services to carry out. So AIS built on SOA can not only realize the original, semantic information collection, but also fulfill the multiple accounting standards by assembling different grained services.

### IV. ACCOUNTING BUSINESS PROCESS INTEGRATION

In ERP, accounting business process is also integrated with enterprise's business process. But ERP fix the business process in systems, once implement has been carried out, it is hard to change[3]. Reference [3] also pointed out, "These (ERP) are facing great technical challenge. But they are not the main cause of failure in enterprise systems. The biggest problem is business problem....Enterprise systems often impose their own logic upon companies' strategy, organization and culture ". At the age of fierce competition, enterprises need flexible business process to support information processing activities. That is to say organization must adjust business process in response to changing environment, and organization structures are also flexible enough to adapt to the changes of diversification and individualization process. In business domain, that is also called business process integration. Systems built on SOA are able to adapt to flexible business process by reassembling Web

services processes.

IT staffs in SOA are also concerned with business process integration. They want to coordinate legacy systems of enterprises with centering on business process and emphasize support realization of business process in technical way. BPEL (Business Process Execution Language) and BPML (Business Process Modeling Language) are used for IT staffs to realize these processes. Because of services' encapsulation, Web services can screen technical details of systems bottom layers. So business managers and IT staffs' common language is business process services. Only they work together well, will systems on SOA achieve the alignment between service process and business process.

Business process integration on SOA actually includes accounting business process, which is totally embedded in service processes. It realizes all-around integration of flow of fund, flow of material and information flow in content and transfers from recording afterwards to active managerial control in treatment. The integration of accounting procedures, business process and management processes, can ensure completeness, correctness and the usefulness of accounting information. Let's take order to payment process for instance (as shown in Fig.2) to illustrate realization of accounting business process and business process in SOA.

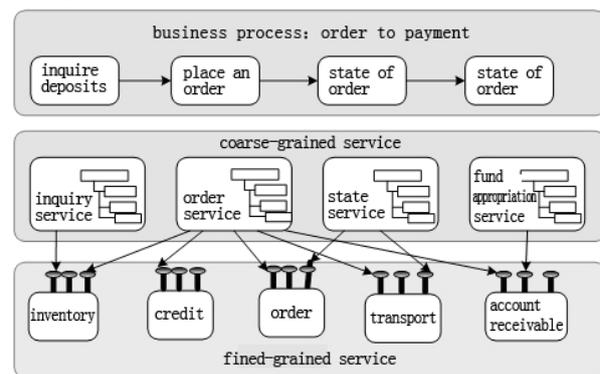


Fig. 2 Illustration of Accounting Business Process Integration

The true value of SOA is integrating process of information system and business process together through services. Owing to services' clear semantic characteristics, IT personnel, accounting personnel and business personnel can interact better to construct information system process and meet for requirement of real-time enterprises. Most importantly, because of reusability of the service, accounting business process can expand from integration within an organization to inter-organizations. Then real-time information transmission and sharing among value-chain alliance will be attained.

### V. REAL-TIME FINANCIAL REPORTS

Real-time financial reports are the output of accounting business process integration. AIS built on SOA can realize collecting original data with service-driven method and achieve full business process integration, which ensure timely accounting information processing. So it is not a difficult task

to implement real-time financial reports. Service itself is based on common standard language XML. With the advanced XML presentation language, such as XLS, XHTML etc., almost any format of reports can be generated, that is only some financial reporting services to change one format to another. Users can choose the preferred real-time financial reports according to their diverse needs. More importantly, these services allow remote authorized users to visit real-time financial reports through Internet, which is very important for value-chain alliance to interchange financial information.

It should be made attention the difference between financial reports based on XBRL and real-time financial report in SOA. XBRL is an XML-based standard for handling corporate financial information, for simplifying the flow of financial statements, performance reports, accounting records, and other financial information between software programs. On March 2005, the SEC encouraged registrants to voluntarily file financial statement information in XBRL format on EDGAR reporting system. The survey made by Premuroso & Bhattacharya [4] on the American stock exchange found that large scale enterprise with good governance and liquidity firstly adopted voluntary declaration XBRL strategy and at the same time XBRL can enhance the transparency of enterprises. It is believed that in the following few years, voluntary filing of financial information in XBRL will turn to compulsory filing decision. For AIS built on SOA, realization of financial reports in XBRL is much easier, only some services that can change them into XBRL format. However, for stakeholders of internal and external enterprises, they deadly need much more multivariate and real-time financial reports and are not restricted by classification standards of XBRL.

In addition, Reference [5] mentioned with the development of Internet and real-time auditing technology, the application of XBRL, current financial report disclosure had not changed a lot yet and compared with real-time economy, disclosure mode was still very "traditional". With information systems built on SOA becoming mature and Web service gradually turning more stable and safe, Securities may directly visit enterprises' financial reports services to generate more reliable and more timely financial reports. This may be a feasible way to change the current financial report disclosure mode.

## VI. CONCLUSION AND OUTLOOK

SOA is an information system architecture standard with most potentials at present and in the future. AIS design built on SOA can effectively achieve comprehensive information collection, accounting business process integration and real-time financial report, which suit the real-time enterprises' development. Although SOA contributes to the realization of systems integration, it also increases many risks. In particular, services relevant to AIS involve sensitive data, once the unauthorized third party, who has the chance to access the important services, may cause divulgence and unauthorized falsification of data. These risks should be paid special attention by designers.

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