Case Study: Architecting SOA Solutions for Changing Economic Environments

The agility and flexibility of SOA solutions make them suitable to virtually any economic environment. SOA solutions bring significant value to growing organizations, and even to organizations experiencing a slowdown.

Using SOA scenarios from IBM®, this paper illustrates how a fictitious company called JKHL Enterprises (JKHLE) uses SOA to adapt to changing economic conditions within their organization, including rapid growth and a slowdown. Though many companies might not want to invest in SOA initiatives during economic slowdown, these periods actually provide a time when SOA can provide tactical as well as strategic return on investment. SOA allows a company to address business and IT challenges efficiently, yielding an organization that can face the present as well as the future.

The paper provides an IT architectural view of how SOA solutions can help as business demand changes and is intended for an IT Architect audience.
**Introduction to the case study**

JKHL Enterprises (JKHLE) has adopted SOA principles to address the business and IT challenges that it faces.

The JKHLE team focused on solving the challenges by creating new customer accounts in a consistent manner throughout each of the sales channels. The solution presented by the team led to an SOA adoption initiative known as the *Account Open Project*. Using an SOA approach allows for more rapid implementation and greater agility to adapt to future changes that the business might need.

JKHLE has customers in multiple market segments. Each market segment is experiencing differing levels of demand. Currently, the small and medium business (SMB) market segment is experiencing a rapid growth in activity. JKHLE needs to adjust quickly to this significant increase in demand. Conversely, the retail segment of JKHLE is experiencing a slowdown, and JKHLE must adapt to this change rapidly. JKHLE also acquired an organization recently to give it a share of the corporate market segment.

**Note:** You can read more about the JKHLE case study in *Case Study: SOA Account Open Project Overview*, REDP-4376. However, this paper contains all you need to know about JKHLE for the purposes of understanding the role SOA plays in changing economic environments.

The case study that we describe in this paper includes the following key actors and roles:

- Sandy Ostrich-Archer, Chief Technical Architect
- Frank Adams, Chief Information Officer (CIO)

**SMB market segment experiencing rapid growth**

Frank Adams, Chief Information Officer (CIO) for JKHLE, asks Sandy Ostrich-Archer, the Chief Technical Architect, how the SOA solution that they have implemented for opening customer accounts will be able to cope with the changing customer demand in the SMB market:

*Sandy, our SMB division has seen significant growth, and we’re expecting it to grow even more in the coming quarters. More and more new customers are enrolling and existing customers are opening new accounts. Will our infrastructure be able to ramp up quickly enough to meet this increasing demand? We need to expand our current operations without adding new staff. Can we cope?*
Sandy assures Frank that the SOA solution that JKHLE has invested in is agile and flexible enough to adapt to this level of growth. Through well-defined standards, best practices, and governance models, JKHLE can interface with a multitude of partner services. Additional workload can be handled by bringing new partners on board to help with the process of opening new accounts or by further exploiting the capacity of existing partners. Additionally, through the adoption of SOA, IT systems throughout the enterprise are well integrated, allowing other divisions within JKHLE with spare capacity to contribute to the Account Open process for the SMB market segment.

We discuss examples of how SOA scenarios can be applied to rapid growth in “Applying the case study to the SOA scenarios” on page 4.

**Retail market segment experiencing slowdown**

Frank discusses with Sandy his concerns about the Retail market segment of JKHLE:

*In contrast to the SMB market segment, our Retail division is experiencing harder times. There is a cyclical slowdown across the Retail sector in our industry, and frankly I suspect this will continue in the coming months. Despite these hardships we need to deliver a high value service to our customers and position ourselves strongly within the industry. We need to control costs and find quick return on investment opportunities. I’m concerned that in this slowdown our fixed costs will exceed our income. How well positioned are we to adapt to these fluctuations in demand?*

Sandy tells Frank that the SOA solution JKHLE has invested in for the Account Open process has all the attributes necessary to adapt to this situation too.

The Account Open process is highly flexible and easy to change. The process can be streamlined to remove non-essential activities. Additionally, lower cost service providers can be introduced into the process flow.

Sandy explains that by altering the Account Open process, fixed costs can be converted into variable costs by outsourcing delivery of certain steps in the process. Because the Account Open process is built on SOA principles, these changes are quick and inexpensive to implement, permitting JKHLE to meet market needs quickly.

We discuss examples of how SOA scenarios can be applied to a slowdown in growth in “Applying the case study to the SOA scenarios” on page 4.
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Corporate market segment experiencing rise in IT costs

JKHLE recently acquired Jensen Inc. to give JKHLE a presence in the corporate market. Frank discusses with Sandy his concerns about this acquisition:

*I'm worried about the rising IT costs associated with the Jensen acquisition. The IT systems we've acquired from Jensen are mostly mainframe enterprise information systems that our existing IT department have few skills in. Currently the Jensen systems co-exist with our other IT systems, but they are not really integrated. This is proving to be costly, and we need a better approach. The corporate market segment could ultimately be very profitable for us, but right now our corporate customers are cautious and we're not seeing the opening of many new accounts. We need to integrate the Jensen systems quickly, but because the corporate market segment is not yet well established I don't have a large budget to invest in this. What can we do?*

Sandy knows that SOA is the answer to this situation. She tells Frank that the Jensen Inc. enterprise information system applications need to be exposed as SOA services. These exposed services will allow significantly easier integration with the existing JKHLE infrastructure. It will also make the applications acquired by Jensen Inc. more accessible to the remainder of the enterprise, promoting reuse of the acquired Jensen Inc. applications throughout JKHLE. This solution provides business agility by modernizing the infrastructure to easily adapt to fluctuations of growth and changing customer requirements.

This service exposure is quick to implement, can be performed with minimal costs, and is the first step to integrating the Jensen Inc. applications into a larger SOA infrastructure.

We discuss an example of how an SOA scenario can be applied to a division with a limited IT budget in "Service Creation" on page 5.

Applying the case study to the SOA scenarios

IBM provides a set of SOA scenarios that help organizations achieve business and IT objectives. Within these SOA scenarios are realization patterns that describe specific ways these SOA scenarios can be used. This section addresses each SOA scenario and shows how a realization pattern from each SOA scenario can be used to help the JKHLE SMB, Retail, and Corporate divisions.

The first SOA scenario, Service Creation, is applied to the Corporate division, who have yet to adopt SOA. The remaining SOA scenarios show how the Retail
and SMB divisions can take advantage of their existing SOA solutions to address changing economic climates.

Note: Each SOA scenario contains many realization patterns that can help the JKHLE divisions deal with changes in customer demand and the economic climate. In this paper, we discuss and apply only one realization pattern from each SOA scenario to the JKHLE divisions.

For information about all the realization patterns, follow the links in this paper.

Service Creation

Service Creation involves the creation of flexible, service-based business components. It allows organizations to identify high-value existing IT assets and service-enable these assets for reuse.

Exposing existing applications as services

Through its acquisition of Jensen Inc., JKHLE has many back-end EIS systems that run numerous business applications daily. In particular, the Billing Account application is written in COBOL and hosted by the CICS® Transaction Server v3.1. The Billing Account application is old but serves its purpose very well, and there are no plans to replace this system.

The Account Open process application needs to use a CICS transaction of the Billing Account system. There is a need to expose the application capability so that it can be consumed by the new Account Open process application, as well as be reused or consumed by other applications and systems.
JKHLE can expose this backend application using the *Direct Export of Existing Applications as Services* realization pattern. CICS Transaction Server v3.1 provides native Web services support, exposing the Billing Account system with a SOAP request and response programming model (Figure 1).

**Figure 1** Direct exposure of an existing CICS application as a service

The Corporate division can exploit this architecture as follows:

- Manually integrating the Jensen enterprise information systems into JKHLE’s IT infrastructure is costly. Exposing applications like the Billing Account system as services makes this integration considerably easier and cost effective.

- The Corporate division has a mandate to control costs and cannot make a significant investment in new hardware and software. This solution enables JKHLE to perform the integration with minimal costs. Existing hardware and application logic is reused, so JKHLE are able to leverage existing systems and assets. The task to expose these application as services is inexpensive. Developers with little knowledge of the existing Jensen applications and enterprise information systems can use wizards to easily expose the existing application functionality as Web services.

- This move to an SOA infrastructure positions the JKHLE Corporate division for future SOA enhancements when budgets allow. They can, for example, incorporate these newly created services into an ESB architecture easily.
Further information
For more information about the Service Creation SOA scenario, each of the realization patterns for this scenario, and how they relate to the JKHLE case study, refer to *Case Study: Service Creation SOA Scenario*, REDP-4377.

Service Connectivity

*Service Connectivity* links people, processes, and information within the business and the extended enterprise through a gateway or Enterprise Service Bus (ESB).

Dynamic routing to service providers

JKHLE uses external service providers to implement a Credit Verification Service required by the Account Open process. JKHLE have implemented this solution using the *Business Value Driven Service Availability* realization pattern. JKHLE make use of two service providers: CVCo provide a low cost, but low throughput option, and Verity offer a higher throughput, better response time service, but at a higher cost. JKHLE use the solution shown in Figure 2 to select a service provider dynamically based on service availability.

![Dynamic routing using an ESB](image)

The fast-growing SMB division can exploit this architecture because this architecture is designed around changing customer demand and meeting service level agreements. When demand is low, most requests are sent to the cheaper CVCo service provider. When demand is higher, and the CVCo service is unable
to keep up, work is routed to the Verity service provider. Therefore increased demand is met by enlisting a second service provider. As demand continues to increase for the SMB market sector, additional service providers can be added to the ESB Gateway, and their workload and response times can be measured by the System Management component.

The slowing Retail division can exploit this architecture because with a decline in demand this architecture is automatically configured to route a larger percentage of work to the cheaper CVCo service provider. On average, this should lead to a cost saving per customer request. Also, this architecture gives JKHLE the opportunity to locate new and cheaper service providers for the outsourced Credit Verification Service function. The use of an ESB and ESB Gateway allow these new service providers to be added without requiring any changes in the Account Open process model.

**Further information**

For more information about the Service Connectivity SOA scenario, each of the realization patterns for this scenario, and how they relate to the JKHLE case study, refer to *Case Study: Service Connectivity SOA Scenario*, REDP-4380.

**Process**

A business *process* is a set of business-related activities that are invoked in a specific sequence to achieve a business goal. Business processes consist of tasks which are comprised of human interactions and automated workflow.

**Process automation**

JKHLE have modeled the Account Open process as a business process using the *Process Automation and Human Workflow* realization pattern. Based on this process model they constructed a WS-BPEL implementation of the business process, and they monitor the process at runtime.
This business process consists of existing services and assets exposed as services along with the newly created services and manual tasks that require human interaction. The products used to construct this business process are shown in Figure 3.

The fast-growing SMB division can exploit this architecture because as demand continues to increase, JKHLE can make sure the Account Open business process continues to perform optimally through business process monitoring. Business process monitoring provides real-time information about the status and results of the JKHLE Account Open solution so that problem areas or bottlenecks in the process caused by the higher demand can be addressed quickly. Business process monitoring can also highlight emerging opportunities by analyzing the business process monitoring data.

The slowing Retail division can exploit this architecture because the sequence of activities in the Account Open business process can be modified easily. JKHLE can elect to remove or change non-essential elements of the Account Open process, thereby reducing costs. For example, the Account Open business
process currently contains a task that sends account customers a hard copy statement in the mail. The process could be modified so customers can elect to receive their statement by e-mail instead. This change to the business process would be easy and inexpensive to implement, and could present significant cost savings to JKHLE through reduced printing and mailing costs.

**Further information**
For more information about the Process SOA scenario and how it relates to the JKHLE case study, refer to *Case Study: Process SOA Scenario, REDP-4381*.

**Interaction and Collaboration Services**

*Interaction and Collaboration Services* are designed to improve people productivity. The solution allows customers in different sales channel to have a unified portal based user interface.

**Using portlets to access services**
The Account Open business process is exposed as an SOA service. JKHLE have exposed the user interface to this business process through the use of a portal, as described by the *Aggregate and Invoke Services Using Simple Portlets* realization pattern.

A Public Portal provides a Web application interface that is used by customers to link to the Account Open process. An Account Open Dashboard is used by customer service representatives and management to monitor the status of accounts in the Account Open process.

The fast-growing SMB division can exploit this architecture because customers interact currently with the Account Open process through a Public Portal that runs in a Web browser. JKHLE believes that they can continue to expand by increasing the channels used to open accounts. The Public Portal can be extended to support mobile devices such as PDAs, thereby providing customers with alternative methods to open accounts, and exposing the SMB division to new markets.

The slowing Retail division can exploit this architecture because, in a slowing market, customer satisfaction becomes an increasingly important factor. The JKHLE Retail division is interested in ideas that will help improve customer satisfaction without incurring significant cost. One such idea is to add a Chat portlet to the Public Portal. The Chat portlet provides a quick, easy, and inexpensive collaboration capability for customers to receive assistance from a customer service representative. The addition of this portlet is relatively inexpensive to develop and provides the opportunity for quick return on investment and improved customer satisfaction.
Further information
For more information about the Interaction and Collaboration Services SOA scenario, each of the realization patterns for this scenario, and how they relate to the JKHLE case study, refer to Case Study: Interaction and Collaboration Services SOA Scenario, REDP-4375.

Information as a Service

*Information as a Service* offers access to complex, heterogeneous data sources within an enterprise as reusable services.

Keeping data clean and available to multiple sources
Account officers need consistent and valid data about customers. In the past customers have received notices incorrectly, and in some cases duplicate customer records have been created across databases because of inaccurate customer data. JKHLE have used the *Data Cleansing* realization pattern to help manage this customer data. When a new account application is submitted by a customer, the application is sent to an account verification business process where the data is cleansed. The cleansed customer information is exposed as an information service, making the data available to any service-enabled application (Figure 4 on page 12).
Figure 4 Data cleansing server

The fast-growing SMB division can exploit this architecture because as the SMB division grows and many more new customers are added, the chances for inconsistent and inaccurate data increase. By automatically cleansing the data using a Data Cleansing Server, JKHLE can ensure data such as customer name and address is cleansed in a consistent and accurate format. As the number of new customer accounts increase, capacity can be easily added to the Data Cleansing Server.

The slowing Retail division can exploit this architecture because, due to the slowdown in demand, Retail is becoming an increasingly competitive market segment for JKHLE, with many companies competing over a shrinking customer base. In this environment it is vital to keep customer satisfaction high. By using a Data Cleansing Server to ensure consistent and accurate customer data, the chances of sending customers inaccurate or inappropriate notices decrease, helping to keep satisfied customers.
Also, by using this architecture, customer data is consistent across the enterprise and easily accessible through a service interface, making it easier to share customer information across market segments for cross-sell and up-sell purposes. It also helps identify high and low value customers across the enterprise. The JKHLE Retail division can use this data to identify high value customers in other areas of the enterprise, and to cross-sell retail services to these customers. This is a low-cost activity that could generate a quick return on investment through the acquisition of new retail customers.

**Further information**
For more information about the Information as a Service SOA scenario, each of the realization patterns for this scenario, and how they relate to the JKHLE case study, refer to *Case Study: Information as a Service SOA Scenario*, REDP-4382.

**Other SOA scenarios**
IBM defines a number of other SOA scenarios, all of which can help organizations in changing economic climates. Consult the following papers for more information:

- *Case Study: Business Process Management SOA Scenario*, REDP-4383
- *Case Study: SOA Design Scenario*, REDP-4379
- *Case Study: SOA Governance Scenario*, REDP-4384
- *Case Study: SOA Security and Management Scenario*, REDP-4378

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