

DELIVERING ACTIONABLE BUSINESS INTELLIGENCE THROUGH SERVICE-ORIENTED ARCHITECTURE

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Abstract: The paper discusses the main characteristics of Service-oriented Architecture and examines the feasible ways of using business intelligence solutions as Web services in an SOA environment. With the evolution of Web services, organizations are becoming more sophisticated in their goals for and requirements of this technology as it offers faster and more flexible deployment, customization and easy integration of BI solutions. Those organizations that choose a Web services strategy will be best positioned to deliver BI content across and beyond the enterprise, making BI accessible to everyone, wherever they work, at a lower cost and in more innovative ways.

1 INTRODUCTION

Service-oriented architecture (SOA) concept and implementations have increased in popularity over the last few years due to the promise this approach holds for reducing development and maintenance cost and making it easy to integrate disparate information processes. SOA concepts are primarily designed to achieve the vision of an agile, possibly real-time enterprise with a flexible IT infrastructure that enables a business to respond to changes in the best possible way (Fersht, 2004).

On the other hand, business intelligence (BI) allows organizations to access, analyze, and share information and knowledge. This helps them to track, understand, target and manage their business in order to improve enterprise performance.

2 THE NEED FOR ACTIONABLE BUSINESS INTELLIGENCE

Business intelligence system is a key component of companies' IT frameworks. It is a component that enables business users to report on, analyze and optimize business processes and operations to reduce costs and increase revenues. Most companies use this component for strategic decisions making where decision-making cycle may span a time

period of several months (e.g., marketing campaign preparation or improving customer satisfaction).

At the same time that companies see business intelligence playing a strategic role, they also want to be able to use insights gained from their data for more tactical decision-making purposes. Enterprise value analytical capabilities, but they also want to be able to take action (Smith, 2003). Interest in dashboards and scorecards has surged because companies want to monitor their performance, but now they wish to take that information to the next step and determine how to act on it.

Defining business rules can help these companies develop step-by-step instructions on how to respond to the data they are getting from their supply chain and incorporate those instructions into their business intelligence and data warehouse systems. BI has a role to play in the operational functioning of the enterprise as well as the determination of its strategic direction.

Competitive pressures are forcing companies to react faster to changing business conditions and customer requirements. As a result, there is now a need to use BI to help drive and optimize business processes and operations on daily basis, and, in some cases, even for intraday decision making. This type of BI is usually called operational business intelligence (Blasum, 2006). The objective of operational BI is to make more timely business

decisions, and, therefore, it has a close relationship to the subject of real-time BI processing.

3 ABOUT SERVICE-ORIENTED ARCHITECTURES

3.1 The Service-Oriented Architecture Basics

The service-oriented architecture (SOA) has been held out for nearly two decades as a substantially more cost-effective and flexible strategy for constructing enterprise software systems than historical approaches including monolithic system design and tightly coupled client server models (Newcomer, 2002). Many IT professionals and industry observers believe Web services technology, and the unprecedented universal vendor support of the underlying standards, will finally make practical the widespread adoption of the SOA approach.

In the past, enterprise software systems were complex, monolithic behemoths. The complexity of these systems made them difficult to fully understand and therefore leverage. There were limited integration points allowing reuse of the embodied business information and processes. This resulted in islands of automation with costly duplication of information across systems. Information flows between applications were limited, preventing the delivery of information to the people and systems that could best utilize it.

Even more damaging to the organization, these systems were difficult to change. Modifications, upgrades and enhancements were time consuming, costly and risky. Since these systems embodied the business processes of the organization, IT frequently became the bottleneck in attempts to adapt the business to changing market conditions.

The very systems that were built to bring automation and efficiency to the processes of the organization now *prevent* the organization from maintaining efficiency as business conditions change.

The service-oriented approach to enterprise software architecture replaces large, complex, monolithic applications with applications composed of loosely coupled collections of modular software components linked through well-defined Web service interfaces (Clabby, 2003). In other words, SOA is an architectural style that promotes loosely coupled interactions between software agents.

One of the best ways of enabling application developers to understand concepts and put them to use is by providing an application framework that provides the infrastructure needed while designing and developing applications based on those concepts. Unfortunately, there is not enough literature that can help application architects and developers in the design and implementation phases to build on the SOA concepts, apart from those from product vendors, which mostly explain in terms of their products/technologies.

In its simplest form, the basic SOA is schematized in Figure 1.

It should be noted that there is no contradiction between the fact that interacting software agents are loosely coupled and the requirement for business intelligence itself to be tightly coupled with business processes. These issues simply do not have mutual influence.

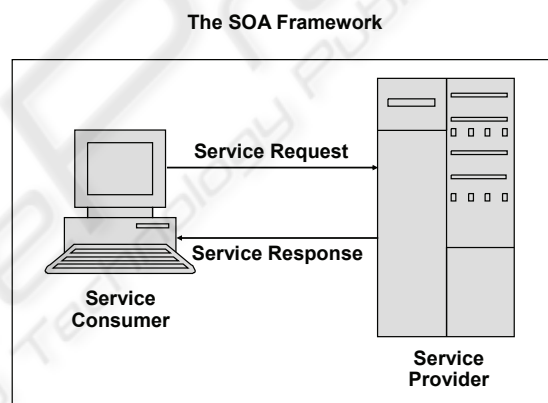


Figure 1: The basic Service-oriented Architecture (Kay, 2004).

3.2 Benefits to Businesses Achieved through SOA Implementation

For the business, the result of the Service-oriented Architecture implementation is movement toward what is often referred to as the 'real-time enterprise.' (Flint, 2003) Because applications have well defined service-based integration points, and because these services are built on standards embraced by every major enterprise software vendor, connecting software systems together will be orders of magnitude easier than in the past.

The ability to move the right information, to the right people and systems, at the right time, maximizes the ability of the enterprise to identify and interpret changes in its markets and to respond by adjusting its processes, operating models or structure.

The business response to changing market conditions often calls for modifying the information systems that run the business. Frequently it requires the creation or integration of entirely new applications. For the IT organization tasked with these activities, the result of SOA adoption is a decrease in the cost and a dramatic increase in the velocity with which these changes can be made.

Cost is reduced in the application development cycle because existing application modules and services can be leveraged as building blocks, eliminating the costly and repetitive exertion of effort that often slows today's initiatives. In addition, because application modules have well-defined service interfaces that facilitate plugging and unplugging, it is far easier to initially or eventually outsource an application component or to purchase and integrate packaged application logic.

Velocity improvements also follow from the SOA approach. Because application development becomes more like "application assembly" when building on existing services, development time is slashed (Thomas Mannes, 2003). Whereas application complexity was high with monolithic systems design, the modularity and relative simplicity of application components in an SOA makes them easier to understand and therefore to enhance and change. And in addition to lowering costs, the ability to outsource or purchase packaged solutions, and then easily integrate them into the application environment, also speeds change.

4 ADVANTAGES OF SERVICE-ORIENTED ARCHITECTURE FOR BUSINESS INTELLIGENCE SOLUTIONS DEVELOPERS

The core value of Web services is that it enables an SOA-style application development paradigm which offers the BI solution developer three key advantages:

Web services are commonly built for standardized interoperability and application program interface (API) evolution – Web services work on every operating system. Their design objective is to deliver APIs that are very simple to use and which evolve over time in such a way as *not* to break existing applications (Lefevbre, 2001). This holds the promise of less overall time spent in application development, maintenance, support and

upgrade, allowing developers to spend more time on new solutions instead of maintaining old ones.

Web services are built on ubiquitous Internet protocols (i.e., loosely coupled, firewall-immune APIs). Web services are specifically designed around the challenges of remote system functional access over the Internet. They can be deployed using current staff skill sets (Kaye, 2003). Web services-based BI solutions can be deployed across corporate firewalls. They can be used where a BI resource is only occasionally available, and they can be consumed everywhere, by desktop client applications, server applications and mobile devices.

The developer may become a BI service provider. Converting BI application solutions into a BI service provider allows the departmental staff to customize their BI content, while insulating central staff from the headaches normally associated with such customizations. Long-term support and maintenance costs decrease because technical support is isolated to Web service calls and invocation.

The concept of usage of business intelligence solutions outside the firm's walls as Web services is shown in Figure 2.

Together these two features give Web services-based solutions a new level of solution agility, adaptability and reuse. This is a reason why Web services technology intrigues and attracts as many people as it does.

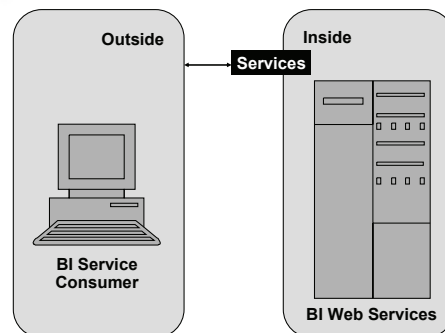


Figure 2: Usage of business intelligence solutions from outside the enterprise.

5 CONCLUSIONS

Business intelligence has become a key component of companies' IT frameworks. It is a component that enables business users to report on, analyze and optimize business processes and operations to reduce costs and increase revenues.

As competitive pressures are forcing companies to react faster to changing business conditions and customer requirements, there is now a need to use business intelligence to help drive and optimize business processes and operations very quickly. This type of BI is usually called operational business intelligence.

The objective of operational BI is to make more timely business decisions, and, therefore, it has a close relationship to the subjects of real-time and near real-time BI processing needed for the business to be agile.

On the other side, the concept of Service-oriented Architecture is becoming widely accepted. They provide a new means of all kinds of application interoperability including business intelligence applications. Our opinion is that Web services will help enterprises revolutionize BI by enabling the conversion of specific BI application deployments into flexible BI service providers that can easily integrate into Web, server and desktop solutions. This will shift the focus of BI solutions from applications to complete networks which provide targeted BI to everyone both inside and outside the organization.

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