

Breaking up the Stack

The SOA Strategy of Progress Software

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► INTRODUCTION

This White Paper provides an introduction to the breadth of solutions provided by Progress Software Inc. (Progress) in support of the implementation of Service Oriented Architecture (SOA). It provides the context around the discrete products delivered by Progress, some of which are described in Butler Group's Technology Audits.

Why has SOA become the vital architecture in today's IT?

Over several decades of IT innovation, organisations have been laying down a foundation of investments in applications and infrastructure that have addressed the business problems of the day. To the frustration of the business world it seems that the greater the investment in IT the more difficult and costly it becomes to do anything new. Within the IT industry we recognise that this is because earlier investments made little provision for changing requirements and gave little forethought as to how the business problem being addressed could be broadened in scope by integration with earlier legacy applications, and also with future generations of technology. The obvious solution of ripping out old applications to replace them with new technology became impossible to justify as the level of investment in the IT legacy increased.

The message is now loud and clear: IT will keep on innovating, businesses will need to take on board new solutions in order to stay competitive, but it is absolutely out of the question that we will be able to cost-justify replacing the entire IT legacy each time a new and improved way of delivering applications surfaces. At the same time, businesses are facing difficult growth conditions with extreme competition, leading to increasing levels of specialisation and the consequent need to implement adaptable partnering strategies, and to adapt and optimise end-to-end processes by making intelligent decisions based on real-time information. IT is faced with delivering these business-critical new capabilities while continuing to execute the existing applications that run the business.

SOA has evolved to fit these criteria. It abstracts the functionality provided by applications (new or legacy) into services that represent activities of value to the business. It then enables these services to be combined and sequenced in many different ways to offer cost-effective solutions to changing business requirements. However, SOA brings its own challenges in terms of technology to enable and manage the environment as well as the skills, methodologies, and organisational issues that impact the roles of IT professionals.

Progress operates in a very competitive market providing software technology that addresses the needs of establishing and maintaining a SOA environment. This White Paper shows the breadth of the solutions offered, but it also addresses the issue of the manner of delivering the technology to the marketplace. Progress believes that resistance to the complexity and cost of SOA can be addressed by providing the right solution to problems as they become relevant to an organisation, rather than providing an overbearing and over-expensive all-embracing technology stack.

How is SOA technology being delivered to the marketplace?

Within the software industry there is a perpetual struggle to achieve the best level of bundling of functionality into deliverable products. The two extremes are to provide a single, tightly-integrated, all-embracing technology stack, or to deliver a set of 'best-of-breed' point solutions that the user organisation will need to assemble to meet their specific requirements.

There are, of course, many arguments for both extremes. Primarily, the full stack (or suite) approach represents simple negotiation with a single vendor, less work in setting up the environment, the knowledge that all of the components will interoperate, and simpler ongoing management. On the other hand, it also represents a level of lock-in to a 'strategic' vendor that might be unacceptable, and limits the ability to extend the functionality (or performance) in a way that is not within the product development plans for that suite.

SOA changes these dynamics. For a start, the capability level required in order to build a functional, high performance, high availability, and manageable infrastructure for SOA, requires a degree of product functionality that is unlikely to be delivered in full by any single suite. Next, because of the extreme scope of the pieces of the solution, it is highly likely that a purchaser of a full-stack solution will wish to replace or supplement some of the pieces with other products that provide a better fit with the local requirements. We should also accept that the industry is still gaining experience in managing SOA over the long term, and our expectations of the infrastructure are likely to continue evolving for some years. Lastly, SOA changes the dynamics because it places a heavy emphasis on interoperability through the adoption of standards, and this applies just as much to interoperability within the technology stack as it does to interoperability between the business services; it should no longer be a major issue to swap out individual functional components and replace them with alternative products. As a result, there is greater potential for different vendors to provide different levels of functionality to address market requirements. This might be as simple as a single product (such as a service registry or a rules engine) or a more comprehensive set of functionality that addresses a sector of SOA requirements (such as governance or service enablement).

However, the market for SOA infrastructure products still appears to be divided between those that position their technology as a full stack, and those that offer best-of-breed capabilities. The current tendency in the market is for best-of-breed product vendors to be acquired by full-stack vendors in order for the latter to strengthen the breadth of their solution. This in itself emphasises the need for interoperability within the infrastructure stack, since existing users of the acquired product (such as a registry) will wish to continue using it with their current technology environment, which might be competitive to the vendor that has made the acquisition. Such 'coopetition' has become a normal feature of the vendor landscape, and emphasises the need for standards-based interoperability.

Within this context, Progress has made the decision to address the market with a set of solutions that address specific areas of the SOA infrastructure requirement. A top-down view of the scope of Progress's SOA products shows that it would be able to provide a viable full-stack solution, but this is not viewed as the best route to market either for itself or its customers.

Progress takes a refreshingly pragmatic view of the SOA market, recognising that for most organisations (and certainly for most large and very large enterprises) the SOA infrastructure will itself be heterogeneous, either by design or by evolution and necessity. It wishes to provide its solutions in a form that can be readily implemented to enhance an existing SOA implementation, providing missing elements, or potentially replacing elements that are a less than optimal fit with the requirements of the organisation.

The remainder of this White Paper provides an overview of the positioning of the SOA-related products within the Progress portfolio. Further details on some of these products are provided in the associated Technology Audits.

► SOA TECHNOLOGY REQUIREMENTS AND PROGRESS PRODUCTS

The adaptability provided by SOA comes from the creation of autonomous business services that represent the functionality of particular business operations. The services are invoked by sending messages that are independent of the physical characteristics of the application code that underlies them. It follows that, although the design of a SOA implementation must major on creating services with the right functionality to meet business requirements, much of the run-time and operational considerations revolve around the need to manage the message flows that determine what actually happens in the SOA environment.

From this abbreviated description flow all of the requirements for technology.

Integration and Service Enablement

The essential run-time infrastructure for SOA is generally referred to as an Enterprise Service Bus (ESB). The primary function of an ESB is to ensure messages sent to and from services arrive reliably at the right endpoint, in the right format to be actioned, and (where the business logic requires) to be delivered in the correct sequence. All of this needs to be provided in a highly-distributed and dynamically-changing environment, and to support the needed level of performance, scalability, and fault tolerance. Beyond this, different vendors bundle different combinations of capabilities to orchestrate the sequencing of services, execute business rules, and provide secure encrypted communications, etc.

Progress's Sonic ESB product family delivers this run-time environment. It is based on a high-performance Java Message Service (JMS) distributed messaging backbone, and provides the message transformation, dynamic message routing, and orchestration services that are required to support the basic run-time expectations of SOA. It uses established standards throughout to enable integration into, or interoperability with, existing SOA deployments. There is an Eclipse-based workbench for developing, testing, debugging, and deploying services and processes, and for tracking the progress of in-flight processes.

A separate Butler Group Technology Audit is available, which contains further details of Sonic ESB.

In most circumstances, services in a SOA environment will be created by 'wrapping' the functionality of legacy applications with application adapters that will accept incoming messages and provide the necessary technical and semantic transformations to match the interface expectations of the application program. Responses from the program will be converted by the adapter back into messages that can then be acted upon by the SOA environment.

The actual requirements for each organisation will be determined by the legacy of existing applications that is already in place. A number of software vendors have created adapter technologies that address different parts of this requirement, and will be appropriate to different customers depending on the nature of their application legacy. In the case of Progress, the most relevant capabilities come from the DataDirect operating unit. In 2006, Progress acquired Neon Systems and merged it with DataDirect. The resulting Shadow RTE product line provides a high-performance means of surfacing applications that execute on IBM Mainframe (zSeries) environments as Web services that can be reused within a SOA environment to form the basis of new business applications.

Additionally, applications that have been created using the Progress OpenEdge development and run-time environment can be readily surfaced as Web services. Progress has many hundreds of application development partners that have created application products using OpenEdge, and Web services interfaces can be created for all of these without any need for additional coding. Progress also provides a Software as a Service (SaaS) enablement programme for partners, with some 200 partners delivering SaaS-based applications. In fact, OpenEdge could be an appropriate product to develop and deploy new services to fill in any functional gaps that might exist in an organisation's service portfolio.

Dealing with Data

One of the inevitable consequences of deploying SOA is that the heterogeneity of source systems is likely to increase rather than decrease. This is because SOA makes it easier to live with heterogeneity and therefore refocuses investment towards new, added-value technology rather than replacing the existing legacy in order to move towards a more homogenous environment. At the same time, the need for advanced analytics and increased intelligence in decision-making emphasises the need for a simpler and more consistent view of information. Intelligent processes as well as individuals need to be provided with the right information in order to ensure that decisions that impact process paths and the ultimate outcome of composite services are based on real-world truths. This requires that information resources must be federated from many sources both internal and external, and presented to the SOA environment as simple services.

Federating multiple information sources has never been simple, but now our expectations need to be raised. The data services exposed to SOA need to be updateable, and logic needs to be embedded in the service to ensure that all of the source systems remain consistent. Performance needs to be scalable and high availability assured. However, the most problematic issue is the need for semantic transformation to ensure that the exact meaning of information is maintained across different languages, different ways of describing a data item, different storage formats, different units of measurement, and different interpretations of 'standard' taxonomies. Beyond this there is a further level of complexity. Since SOA enables the accommodation of rapid change, the technology must tolerate ongoing changes to the information contents of the source systems and the information requirements of the information consumers.

This all adds up to a lot of complexity, and requires dedicated software to make it manageable. Progress addresses this issue with DataXtend Semantic Integrator (DX SI). DX SI is the result of the 2006 acquisition of Pantero. The product accommodates the change requirements by implementing a three-tier data model. The central tier (the 'common business model') represents the overall information requirements of the organisation, represented in the semantics that make it most useful and useable. Beneath this is a data model that represents the information made available by source systems, representing this in the way that it is actually exposed by the applications or data storage.

This source data is mapped to the common business model, and transformations are defined as needed. The top layer of the model represents the requirements of individual information consumers, and represents the information in the way it needs to be made available. This layer is also mapped to the common business model together with the associated transformations. This combined intelligence is distributed to the end points across the SOA environment, in a managed but adaptable manner.

DX SI is described more fully in a separate Butler Group Technology Audit.

SOA Management

The last, but potentially most challenging, piece of the SOA infrastructure puzzle is that of building a governance framework that creates a controlled environment across the whole lifecycle of the SOA deployment. SOA Governance can be considered as four discrete requirements: Program Governance (including strategy, alignment with business objectives, roles, and responsibilities); Design-time Governance (including service definition and discovery, policy definition, registry, and repository); Run-time Management (including performance monitoring and measurement, visibility, security and access control, and policy enforcement); and Change Management (including lifecycle management, version control, and change synchronisation). While all four of these requirements will need to be considered by organisations deploying SOA (and ultimately all will require some technology support), the requirement that will be most immediate upon deploying a live SOA solution will be that of Run-time Management.

Run-time Management itself could be subdivided into visibility (gaining a detailed insight into the health and performance of services and processes); Service Level Agreement (SLA) management (dynamically allocating resources and changing priorities to ensure that critical SLAs are met); and policy enforcement (ensuring that defined policies concerning compliance, conformance, security, etc. are enforced throughout).

Progress Actional (the result of Progress's 2006 acquisition of Actional) provides three complementary products that focus on these three elements on Run-time Management. Actional employs unique technology to enable the central management of the environment and central definition of policies, while distributing the intelligence to low-overhead components that execute within the end-point environment (such as the application server on which the service resides). It can also be deployed through proxies so as to manage external services.

A separate Butler Group Technology Audit describes the Actional products in more detail.

Complex Event Processing

Within a SOA environment, there always needs to be an identified trigger or event that causes an activity, such as a process execution, to be initiated. In most instances, the majority of initiating events will be a user interaction (e.g. via a portal or Web self-service application) or the receipt of a message from outside the organisation (in a business-to-business context). However, in some instances the trigger might be the existence of a condition, such as an out-of-stock condition triggering a reorder process. In more complex scenarios, dedicated software is required to monitor events and determine when a particular combination of circumstances requires an activity to be initiated. This is generally referred to as 'Complex Event Processing' (CEP). It is a common requirement in the financial services industry. For example, real-time monitoring of many different stock portfolios against over-exposure to a particular type of investment, cannot be managed effectively by conventional programming models. There is a requirement to bring together diverse types of information including traditional database systems that record the current investment profile of each portfolio, and external data feeds – in this instance RSS stock feeds.

Progress Apama, the result of the acquisition by Progress of the CEP platform vendor Apama in 2005, is one of the leading products that has been created to manage just this type of requirement. Its architecture reverses the usual mechanism of streaming queries against a data source (a simple approach that will not scale to the level required by most complex event scenarios). Instead, the queries are processed to create algorithms that are stored in a database, and the data events are streamed against these algorithms. By using caching and parallel processing, Apama can be scaled to manage extremely high throughput in real time. When targeted criteria are met, Apama can initiate a message into the SOA environment, kicking off a process to take the appropriate action.

► PROGRESS'S SOA STRATEGY

From the above descriptions it is clear that Progress has the capability to provide a strong SOA technology stack that would compare favourably with other SOA infrastructure stacks. However, Progress does not wish to position its products as a single 'take it or leave it' stack. Instead, it has created a number of discrete products and product groupings that address specific areas of technology need. Each of these has been architected to make it as simple as possible to deploy it within a heterogeneous technology stack. The objective is that each product can add value to the overall SOA environment, and can be deployed piecemeal to resolve areas of weak or missing functionality according to the requirements of individual user organisations.

Progress has built out its SOA capabilities through a combination of internal development and acquisition. Although the product set is strong, it is certainly possible to envisage technology areas that could be the target of further developments or acquisitions. Possible targets could range from high-level business modelling to a business rules engine (neither of these has been suggested as a potential by Progress, and there are several other possibilities.)

Progress has always partnered widely in addressing its markets, and this continues to apply to the SOA space. For example, although Progress provides its own Business Process Execution Language (BPEL) orchestration engine within the Sonic ESB suite, it has a strategic partnership with Lombardi to jointly market the Lombardi Teamworks BPM platform along with the Sonic ESB. Such partnerships should be mutually beneficial in being able to address a larger market segment.

Progress targets the large to medium-large enterprise sector. Over time we would expect to see the market evolve to address the mid-market more directly, and Butler Group believes that Progress's existing penetration into this market through its partnerships with application providers, will give it a strong position.

► CONCLUSION

Most large and very large enterprises now include SOA as one of the central pillars of their IT strategies, and over time this is likely to propagate down to smaller organisations also. The reason that adoption of SOA has become so widespread is that it offers a very good fit with current business demands:

- It breaks the traditional monolithic approach to application suites into a more modular architecture that gives organisations greater freedom to shape the software around their business model – instead of vice versa.
- It offers ongoing adaptability that will increase the ability of the organisation to respond to changing pressures and new opportunities.
- It does not presuppose that those adopting SOA will take a green-field approach and replace previous investments – rather it emphasises the need to extend the value of existing investments and have them participate in the new architecture alongside the deployment of newer technologies.

Although SOA is architecturally easy to understand, it does not follow that it is simple to deploy. A considerable breadth of technology will be required to design, deploy, and manage a SOA implementation so as to achieve the above benefits without losing the ability to govern the environment and to understand the rich information it is capable of providing. However, not all of this technology will be required immediately, and the choice of technology products will impact the roles of many staff in several different disciplines within the organisation.

Because of the different roles and timescales involved in the selection of technology it is not always the best solution to look to a single software vendor to provide all of the required technology. In fact, SOA is still at the stage of evolution where we should expect our understanding of the requirements of the technology to continue to evolve for several years. Even if a single 'strategic' vendor is determined to be the most appropriate choice for a particular organisation, it is highly likely that whichever vendor is selected, there will be requirements to supplement the products delivered with point-solution or 'best of breed' products to make up for missing or weak functionality in certain areas.

Progress Software has created its product portfolio to fit this reality. It is certainly possible to create a SOA deployment based around a wall-to-wall implementation of Progress products, but the products have not been constructed or marketed with this expectation. Instead, Progress provides a comprehensive set of products that each address a particular area of SOA technology requirements and which can interoperate with competitive product stacks as well as with each other.

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