CROSSING OVER
Middleware migration solutions helps businesses to migrate seamlessly.

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Introduction

Are you looking to standardize the middleware stack? Are you looking to upgrade your middleware platform or migrate to another platform? Are you geared with the complete tools if your vendor is withdrawing support for the current middleware platform?

Out of the several drivers for such considerations, commonly found reason in major cases is the higher value proposition of the new platform or the immediate need created due to the current middleware platform becoming obsolete. It is certain that the standards-compliant, end-to-end and multifaceted middleware platforms are very critical for enterprise IT in order to establish and sustain dynamic, real-time, on-demand, and agile enterprises. Several technological advancements have been witnessed in the middleware landscape, such as

- Robust middleware platforms introduced by diverse software infrastructure solutions vendors.
- New standards, features, patterns, practices, and metrics are unearthed in the middleware landscape in order to bring in a stream of disruptive and transformative innovations.
- The middleware ecosystem is consistently growing as both the open-source and commercial-grade groups are consciously striving hard and stretching further on producing business-enabling middleware platforms.

Also gaining visibility in the global market is a distinct trend, “middleware migration”. Some established middleware platforms are getting discarded or dropped from the roadmap as more compact and comprehensive middleware platforms are coming up. Also majority of the existing middleware products are continuously revisited and refurbished to anticipate and tackle new requirements more efficiently. Such rapidly changing environment insists on the need of smarter solutions for end-to-end middleware migration.

In this paper, we would like to illustrate on the long-standing software engineering principles for building and leveraging next-generation middleware migration solutions.
The Growing Market for Middleware Migration Solutions

Middleware products and platforms are significantly crucial for the survival and success of a business, with the constant expansion and extension of business boundaries and horizons. The underlying technology has to be made competent and compatible for the wider diversity, distribution and decentralization of business entities. A peculiar yet pervasive trend in the IT domain is the arrival and articulation of both standardized as well as proprietary technologies. Heterogeneity undoubtedly rules the technology space and spikes the complexity due to the persistent rise of diverse IT elements and entities. IT solutions and services need to be interoperable in order to provide benefits and share their specific competencies. Connectivity at network level and integration at application and data levels are very important in order to have highly strategic integrated environments. In a nutshell, multiplicity and heterogeneity lead to IT complexity and generation of new challenges. Middleware platforms in the form of integration containers, buses, hubs, fabrics, appliances, adaptors, and engines have made a greater and deeper mark on the integration front.

In the recent past, Enterprise Service Bus (ESB) has turned out to be the standard for message-oriented service middleware. ESB is the most prevalent and powerful middleware instrument and tool for establishing integrated enterprises. Further on, services and messages cooperate cogently in order to facilitate real-time and dynamic enterprise technology. All the leading middleware software vendors are renovating, refactoring and even re-architecting their older middleware products to remarkably fit the impending service-sponsored and cloud-enabled knowledge era. That is, middleware products are constantly getting updated and upgraded to be functionally worthy to deliver extra value and power for new type of businesses and IT requirements.

There are various types of middleware platforms catering to different market segments and business requirements. However due to the ubiquity of service paradigm, ESB is the overwhelming winner. The middleware market offers both generic and industry specific solutions. The specific middleware platforms are designed to cater explicitly for certain industries. For example, middleware products are available specifically for healthcare domain that can handle all kind of healthcare standards and data formats with ease.

Two commonly observed reforms in the middleware product space are middleware upgrade and migration. It is a common trend that middleware platforms are acquired and modified in order to take care of new end user requirements. Some solutions are becoming obsolete and gradually fading away. Some middleware products have the capability to withstand the pulls and pressures of the economic uncertainty and keep up to the pace in the competitive era by bridging the gap between solutions offered and business requirements. As a part of market penetration strategy, product vendors with middleware platforms are bought over by larger companies in order to strengthen their product portfolio. As indicated above, there can be two types of requirements faced by business globally. One that would require a middleware upgrade as product vendors are constantly releasing new versions with additional functions, features and facilities. And the second would require migration from one middleware platform to another.

Middleware market primarily comprises of various open-source as well as commercial-grade middleware platforms. It has become vital to be prudent and pertinent while identifying and embracing appropriate middleware in order to reap the envisaged benefits of middleware-sponsored business integration. Businesses should have the clear articulation of integration standards, methodologies, metrics, patterns, and best practices, to facilitate a simpler process of zeroing down to the correct solution.

Business organizations need to understand the importance of being proactive in embracing promising and potential technologies in order to provide cutting edge services and solutions for their consumers and clients. In this highly competitive and knowledge-driven market, technology adoption has become mandatory for enterprises to pace ahead and maintain a competitive edge. The middleware technology especially has been a significant contributor in realizing integrated and extended enterprises.

With the emerging technologies, dynamic infrastructures and platforms complying with industry-strength and open standards, inventive design approaches, facilitating frameworks, Migration has become an important and insightful activity in any IT environment. Technology adoption has been an ongoing process for any business to smoothly persist and progress in a competitive environment. Thereby the need for migration is being felt across widely. Due to the enormous growth of proprietary technologies and the increased focus on distribution and decentralization of IT, the relevance of middleware in establishing and sustaining seamless and spontaneous interactions among heterogeneous systems locally as well as remotely assumes an interesting proposition and prospectus. With the evolution of industry-strength and open standards for business integration, the middleware landscape is consistently on the move. Supported with various reasons, certain middleware platforms are being decommissioned whereas some are being consciously upgraded in order to match the newfangled requirements efficiently and effectively. Such developments in middleware market calls for nimbler migration solutions for automating the end to end process of middleware migration.
As IT complexity is consistently on the rise, complexity mitigation has always been a topic of deeper study and research. There are several significant architecture-design principles, divide and conquer techniques, risk or regret-minimization frameworks, best practices, modeling and script languages, etc. for bringing some rationality and clarity in software engineering. Experts and researchers have clamorously pitched in for the modularity principle in order to offset the unbridled growth in the engineering complexity. Modularity has been the key engineering principle for building mission-critical, dynamic and real-time applications.

Conceptually modularity means loose coupling and cohesiveness. That is, all kinds of software building-blocks such as classes, components, services, agents, aspects, composites, events and models need to be loosely coupled as well as cohesive. Loose or light coupling means that the participating modules need to be clearly delinked from one another. That is, the dependency level between any two modules in a system is very low and hence replacement or substitution of modules with advanced ones is inherently activated in a risk-free manner. Another point to note is that any change in one module does not have any cascading and constriction effect or impact on other adjoining modules in its vicinity or in the neighborhood. In a delinked environment, testing can become short spanned and simple, especially there may not be any need for regression testing. Cohesion refers to the level of closeness with which the different functions of a software application are inter-related with each other. Typically software programs are developed or assembled through different inter-related functions representing some unique capabilities. Thus the much-insisted cohesiveness characteristic in any object-oriented programming (OOP) paradigm means that all the logically related and relevant functions need to be smartly identified and clubbed together in order to avoid any kind of latency-induced performance degradation and security risks due to interactions among segregated functions. Migration solution can be built as a growing collection of independently developed and maintained modules that support easy configuration.

Crafting a Common and Technology-Agnostic Representation

The Migration solutions or tools parses the source middleware and creates a technology-independent model of all the identified components of the source platform. This is similar to reverse engineering process in order to create a reusable, configurable, customizable and generic abstraction of the source middleware platforms. Logical model such as this is a fertile foundation for realizing a physical and technology-indicated target application that can be readily deployed and executed. That is, reverse and forward engineering techniques are positively contributive and critical for middleware migration automation requirements.

There are several guiding principles to achieve the envisaged target. The most visible and valuable phenomenon in any middleware migration process is the automation. The migration task needs to be accelerated by utilizing scores of competent hierarchy-based tools and a well-defined and developed componentized framework. Such a generic and principles-driven solution is capable of handling vendor-agnostic middleware migration quickly and easily.

**The Middleware Migration Process** - The dominant steps [Figure 1] in the middleware migration activity are enumerated below.

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**Figure 1 – The Middleware Migration Process Steps**
• Assess – This phase includes gaining a deeper and broader understanding about the structure and behavior of the source platform. The key steps involved here include a purpose-specific analysis of its service capabilities and competencies, base-lining of all the available services, decoding the message flows, assessing the mapping needs, listing of all the adaptors and finally assessing the configuration and the environment aspects of the source platform.

• Plan – Once we have the sufficient knowledge about the existing system, then there has to be a planning phase to migrate towards the target. This phase includes certain steps including the creation of a conceptual architecture for the target platform. Further on, service rationalization has to be accomplished by decommissioning all the redundant services towards a lean and optimal environment. Based on the knowledge gained in the previous step, a pragmatic migration strategy has to be developed and reviewed to make it more appropriate and accurate. Other prime activities include scenario mapping and tool usage strategy. Finally, implementable plans need to be crafted for migration and decommissioning tasks. The environment test plan also has to be in place.

• Migrate – Once the migration plan is articulated, the migration activity has to be activated and accelerated. The prominent steps include setting up the target environment. There has to be an update on the service design that is more tuned for the new environment. Wherever appropriate, right and relevant tools need to be selected and smartly leveraged in order to automate the migration process. All the services need to be customized as per the new requirements. Finally, unit testing has to be performed to validate the system.

• Validation & Deployment – Pre-developed test plan and cases have to be modernized in order to make them fit and ready to use for the new environment. In this step, a number of testing assignments are required to be accomplished. The key testing needs such as system and integration testing, and performance engineering and enhancement (PE2) testing have to be systematically performed. The final testing is the acceptance testing. With all the design, development, and testing steps completely executed, the real-world deployment and rollout are bound to start towards the logical conclusion.

The Framework of a Typical Middleware Migration Solution.

Any viable migration solution has to be based on the proven modularity principle, middleware patterns and service paradigm. The major modules of the solution are a Middleware migration process and a Middleware migration framework. The Middleware migration framework comprises of the following:

- A Collection of Migration-Automation Tools
- A Bevy of Simplification Templates / Checklists / Best Practices
- A Compendium of Expert Guidelines based on the vast Implementation and Migration Engagement Experiences across the business verticals
- A number of highly configurable and flexible Modernization, Migration and Transliteration Tools

The Key Characteristics of Middleware Migration Solutions

The prominent parameters include:

- A natural and seamless migration path from the current environment
- A short learning and implementation curve
- A reduced impact on implementation and operations staff
- A lower total cost of ownership (TCO) and higher return on investment (RoI) than the existing solution
- Enhanced behavior, features and functionality of the current solution

Benefits of Middleware Migration Solutions

Having considered the growing market for middleware migration projects, innovation-focused enterprises have built concrete solutions from the ground-up with inbuilt capabilities of smartly leveraging the above-mentioned modularity principle. The solution comprises of appropriate and relevant tools in the form of assessors, parsers, translators, etc., in order to automate the various tasks associated with the smooth migration from one middleware to another one. The solution offering includes a middleware migration framework and methodology, which are there in order to speed up in accomplishing the migration task systematically without any visible as well as invisible risks. Based on the use cases the robust migration solution ensures various benefits such as:

- Up to 30% Effort Saving in the Migration Task
- Up to 30% Reduction in Migration Cycle Time
- Ensures Predictability and Consistency During and Post Migration
- Reduces Risks & Errors During and Post Migration
Conclusion

Instead of code-based software engineering, tool-supported and standards-compliant configuration-based software building approach gains wider prominence in these days. Componentization has been the dominant and decisive mechanism in order to establish easy-to-develop and modify software packages. Decomposition and composition are the ultimate formula for software engineering. In this paper, we have elaborated the method extensively used for migrating from one middleware platform to one or more middleware platform dynamically and programmatically. That is, middleware migration is not an easy task and it needs a lot of planning, proper execution, visualization of all kinds of risks and threats, leveraging a compact and cognitive migration process, acceleration of migration activity phases through a reduction of cycle timings, etc. The migration solutions would act as a key to unlock the IT complexity and allow businesses to achieve faster time to market in a reliable and seamless fashion in the middleware industry.

The Author Bio

Pethuru Raj PhD has been an Enterprise Architecture (EA) consultant in Wipro Technologies, Bangalore. He is an author of book chapters for a host of technology books (SOA, Cloud Computing, BPM, Big Data, the Internet of Things (IoT), etc.) being edited by internationally acclaimed professors and professions. He has been writing blogs on technology trends for international groups. He has authored a solo book with the title “Cloud Enterprise Architecture”, which was printed and published by CRC Press, USA. The book details are in the page http://www.crcpress.com/product/isbn/9781466502321

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