Research on the Architecture of Dynamic Alliance of Enterprises

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Abstract. With the remarkable development of internet industry, the dynamic alliance of enterprises will become the main participant of market competition. Because of the missing of top design, there are many conflicts and disorder during the development of dynamic alliance of enterprises. In this paper, we expanded the enterprise architecture design method which commonly used to model a single company, and built a top design method for dynamic alliance of enterprises. With the help to this method, we can coordinate the strategies, business and IT of the dynamic alliance of enterprises and make the information sharing and cooperation between members of the alliance more correctly and efficiently.

The Connotation and Development of the Enterprise Architecture

Enterprise architecture comes from enterprise modeling. Prior to the mid-1980s, the enterprise architecture was still in its infancy stage. Theories and models of enterprise modeling was often applied to the design and modeling of a single system. In the mid-1980s, John Zachman had first proposed the concept of "information systems architecture framework" (which had recognized as the beginning of the enterprise architecture area), analyzing an enterprise from the perspective of information, process, network, personnel, time, and basic principles. [1] The "information systems architecture framework" concept, marking the enterprise modeling study from a single system to the entire enterprise. Thereafter, DODAF, FEAF, TOGAF which are the representative of the enterprise architecture framework and the practice have developed rapidly.

Nowadays, under the tidal wave of internet, the internet industry is on the rise. Internet industry is enterprise-centric, converge the traditional chain with internet technology, and seeking the new management and service delivery model, to provide consumers with better service experience to create higher value industrial patterns.

Internet industry means that enterprises, ecological chain relationships and life cycle will realize the internet, enterprise production and organization, business models and industry boundaries will be changed [5].

Enterprise architecture framework is the overall picture and structure of the information technology, which should urgently adapt to the above situation change. However, the core of current theory and practice of enterprise architecture is elements within the enterprise, which is lack of systematic methods of corporate external elements and information exchange modeling between enterprises. At the same time, the existing top-down design methodology of enterprise architecture cannot meet the needs of dynamic alliance enterprise architecture modeling in the outcome granularity, operability and flexibility. In addition, the technical architecture of the existing enterprise architecture needs to fully adapt to the cloud IT technology trends which is the representative of IT technology trends. Therefore, it’s urgent to extend the connotation and...
extension of the enterprise architecture theory system, so that it can adapt the enterprise information construction dynamic alliance development trend effectively.

Development Demands of Enterprise Architecture of Enterprise Dynamic Alliance

Enterprise architecture is a standard method and the reference framework, at different stages of the development of enterprises, the content is different. In the era of the internet industry and enterprise dynamic alliance, enterprise architecture needs to be extended in both connotation and extension.

In the expansion of connotation, the traditional enterprise architecture focus more on how IT is consistent with business under the existing business model. Under the background of internet industry and enterprise dynamic alliance, business subversion and innovative become the new normal. The top-level design process needs to fully embody the prompt response of business innovation. This requires the existing enterprise architecture content framework and management control system needs to be innovative. In the perspective of content framework, business structure needs to focus more on business model innovation; and application architecture should focus more on fine-grained service abstraction and service portfolio; data architecture should focus more on the unified data model establishment between enterprises; technical architecture should focus more on agile and flexible IT infrastructure and the fusion application on cloud computing, big data, the internet of things, mobile internet and smart city. In the perspective of management and control system, on the one hand, method and mechanisms which match the elements in life cycle management of cross enterprise architecture should be established, on the other hand, entire process automation control tools system which covers the enterprise architecture design, application development, application deployment and the whole process of operation should be established in order to support implementation of enterprise dynamic alliance.

Enterprise Architecture Design of Enterprise Dynamic Alliance

Under the background of the Internet industry, enterprise architecture provides a standardized description of the business enterprise dynamic alliance, unified data model, flexible application assembly, content framework of dynamic enterprise alliance cloud services, and methodology, based on these, it describes completely the components and relationship of the dynamic enterprise alliance.

1) Describing the business standardly base on the unified language: relying on enterprise architecture meta-model (especially business architecture meta-model), which has developed to a unified language for describing the unified business language. Unified language is familiar used by the business staff and IT staff. Meanwhile, in order to adapt with the looseness, instability, understanding and dynamic of the dynamic alliance, the enterprise architecture meta-model and methodology is required to have the agility to support business personnel in architecture design agility adjustment (especially business architecture design).

2) Data sharing based on unified data model: data sharing is a necessary foundation for dynamic enterprise alliance operating effectively. Establishing the dynamic alliance enterprise unified conceptual data model and logical data model after unifying enterprise dynamic alliance data semantics to carry out data enterprises interaction and sharing base on the unified data model. Performing the data asset management and operation of enterprise dynamic alliance and
excavating the value of data asset will support the enterprise in rapid decision-making. Strengthening enterprise dynamic alliance based on the core of data can make the enterprise dynamic alliance ecology prosperity.

3) Constructing applications flexibly based on service composition: establishing the method and mechanisms of combination of top-down and bottom-up and data-driven of service asset identification, design, management and control, sedimentation and application. Developing services and carding the service content systematically, realize the sedimentation of technical and business, to improve the service versatility and reusability. Constructing the applications based on the service assets to make the application modules become highly connected and loose coupling. By reusing the module precipitation to construct applications quickly base on the ways of workflows to realize service asset combination.

4) Providing the enterprise alliance cloud services based on IT infrastructure of more clouds end, less PC and data center end: building a solid and reliable, open and sharing cloud platform, deepen the platform plus application agile mode, focus on the elasticity, expandability, stability and automated, on-demand deployment capability of the resources in the platform, so that to improve resource utilization efficiency. Relying on IT infrastructure of more clouds end, less PC and data center end, to construct the cloud services of enterprise dynamic alliance, so that the member enterprises can share SaaS service. In this case, information construction mode and information systems integration approach mode will become more innovative, and technically protecting the member companies in information sharing and business collaboration.

According to above content of enterprise architecture, the picture of enterprise dynamic architecture of enterprise architecture design and management control, application implementation, the whole process of operation scheduling implementation, and covering different layers such as resource layer, service layer, application layer and access layer can be seen as below:

A. Enterprise Architecture

Constructing the content framework and architecture design methods that adapt to the enterprise dynamic alliance by undertaking the strategies, precipitating enterprise dynamic architecture assets (architecture design results), and form the methods of whole process architecture control and management for guiding the enterprise alliance information construction conducting orderly.
a) Working out a unified architecture content framework and design method within the alliance, for supporting the work of service-oriented architecture engineering design effectively which should be familiar and mastered by business staff and IT staff within the member companies.

b) Working out the enterprise dynamic alliance architecture design results according to the content framework and design method. Architecture design results that cover different levels of the enterprise, with the characteristic of abstraction and generality, it can guide the services of IT infrastructure upgrade and application implementation effectively. At the same time, information technology tools can achieve the outcome of structural management, one time modeling, overall correlation, visual display and automatic correlation analysis.

c) Constructing the flat, agile management and control system and method. Relying on the platform of modeling, design, management and control, operation scheduling and automation control to develop the alliance strategy, the whole process of business to information technology, automation control and also develop the one time modeling, the overall correlation, rapid iterate application, automated test, gated launch, continuous integration, efficient operation scheduling, automatic correlation analysis and panoramic visual display to make sure the architecture asset compliance and reasonable, consistent and dynamic preservation, so that the enterprise can agile control the develop direction of the whole dynamic alliance.

B. Application implement

Based on the results of unified design, developing the layered structure which including resources, services, application and access, within the layer, they evolved independently, and the layers are loose coupling with each other. Also developing the dynamic configuration of resources, flexible expansion, and sharing the services assets to enhance the application service quick assemble ability and supporting the agile development and fast iteration, so that the information technology can support the member companies in business innovation and expansion.

a) Resource layer: resource standardized, lightweight, relying on automated operation scheduling mechanism to achieve efficient allocation of resources, flexible scheduling, elastically stretchable, self-healing. Developing the standard operating environment, simplify the infrastructure complexity, so that development, testing and operation can base on the unified standard environment to achieve the quick development, testing, deployment and operation of the application and service.
Standardization: implementing the infrastructure integration and standardization in the prototype system, eliminating the differences in hardware architecture (server architecture is the architecture X86), building a function domain partition, high availability and security compliance resources pool to achieve the unification of development, test and operating environment.

Light-weighted: base on container technology, packaging the hardware resources in the bottom to achieve the resource rapid deploy dynamically and flexibly.

b) Service layer: unify the service-related concepts and terminology description, to form a reasonable service layer structure and service asset identification, design, management control and methods and mechanisms of application, precipitating the consistent, coherent and highly reusable service assets. Service assets is classified into two categories which are technical services (including data management services, messaging services, processes services, etc.) and business service (including organization, personnel, equipment management, etc.), for their different characteristics, different strategies should be used for precipitation. Technical services is focus on service of mature IT infrastructure software, however business service is focus on the abstraction of member enterprises’ common business.

c) Application Layer: the construction of application has changed from system unit to module unit or service unit, the evolution of applications is now running fast by small steps, supporting the applications partially launch lightly, rapid iteration and IT product evolution speedily. The flexibility of applications has been improved, and the application styles has been diverse, which make the differentiation and individual demand become possible.

d) Access Layer: perform a unified access visit so that the users’ 5A visit ( Anyone, Anytime, Anywhere, Any device, AnyApp). At the same time, providing the users with customize exclusive system which is designed according to their individual demand, to enhance the user experiences.

C. Operation Scheduling

Using the automated tools to effectively resolve the complexity of the operation scheduling, to achieve the unified operation management, operation maintenance, and operation monitor of the resource, service and application. They also support the auto deployment, dynamic monitor, fault location, fault recovery and service level management of the resources, services and
applications, which can improve the automation level and efficiency of operation scheduling, the perceptiveness and pertinence can be also improved and change from passive to active.

Infrastructure standardization and light-weight together with the operation scheduling tools, combined with the resource on-demand, automated scheduling and monitoring, can meet the standards of performance, availability, service quality, security and compliance requirements of infrastructure architecture, applications and business, so that the automated service level can be improved.

**Conclusion**

This article is expanding the connotation and extension of the traditional, individual enterprise oriented enterprise architecture methods, to adapt the top-level design of enterprise dynamic alliance. So as to realize the effectively integration of enterprise dynamic alliance members from corporate strategy, business to informatization that supporting information sharing, effective collaboration and win-win cooperation of enterprise dynamic alliance.

However, enterprise architecture design method for dynamic alliance is still in rapid development period, in terms of methodology, content framework, service-oriented design methods, control systems, tools and methods, there is still a lot of research needs to be done. At the same time, facilitating the launch of enterprise architecture concepts and methods. On the one hand, related ideas and concepts needs to be advertised and popularized, on the other hand, when making the standard specification, the current standard specification and implementation mechanisms need to be innovative.

**References**