CHALLENGES IN IMPLEMENTING ESB (ENTERPRISE SERVICE BUS)

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Abstract:

 The Enterprise Service Bus (ESB) is the most reliable solution for the organizations running high end mission critical applications and multiple applications and services, where number of transactions takes place on day to day operations. The ESB approach is more promising and isolating the applications more securing and smoothly then the Enterprise Application Integration (EAI) and Service Oriented Architecture (SOA).The ESB Infrastructure approaches best practice defines clearly the need of business and organizations in terms of cost saving on the maintenance of various applications and services and stream lining them into a single interface which is easily manageable and saving a lot of time in configuration rather than coding the interfaces. This report first explains how the application working on EAI architecture and then it describes the challenges in implementing ESB. Secondly it explains the architecture of ESB and shows a framework that can be followed as a standard, it also describes the data flow of ESB components. This report has also highlights the benefits of ESB and highlights what type of organizations need to adopt ESB solutions? ESB is the next generation of EAI and the future of application integration. It can be further enhanced as Integration Platform as a Services (IPaaS) with cloud computing technology.

Keywords:Enterprise Service Bus, IBM, Integration, Dataflow

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1.Introduction: With the changing demand in business the information technology presently ongoing globalization stage where enterprises all over the world have to face a challenging competitions. To stay in business, they have to automate the business processes by integrating it with their business partners and provide a new way of services to the customers. The Enterprise Service Bus promises to build up a SOA by iteratively integrating isolated applications into a decentralized infrastructure [1]. Enterprise Service Bus (ESB) is software architecture for middleware that provides fundamental services for more complex architectures, it incorporates the features required to implement a service-oriented architecture SOA. ESB can be thought of a mechanism that manages access to applications and services to present a single, simple and consistent interface to end-users via Web or forms based client side front ends [2].

2.Literature review: In this we will also discuss two types of EAI one is Data-Level EAI and Application Interface-Level EAI. Data-level EAI is related to the data integration, this technique is used in typical EAI-enabled enterprise. The data is moved from one data store to another and processes the information if required. The main advantage of this approach is that there is no code change which saves the cost of redevelopment; refer to the Figure 2.1 as shown below [4]
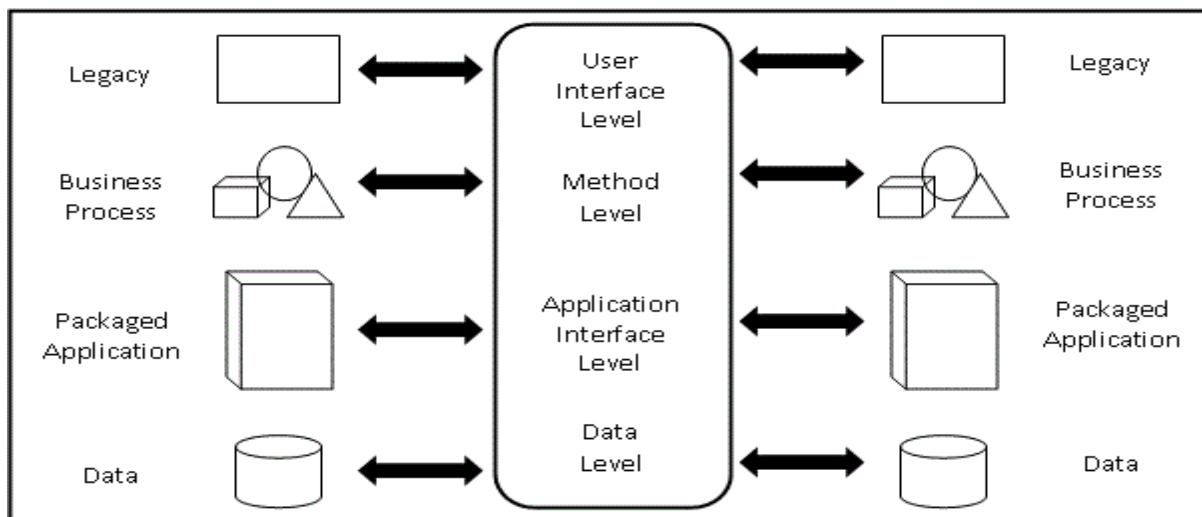

Figure 2.1 - Data Level EAI

3.Materials and Methods: ESB is based on ideas from EAI, in special message routing and transformation. But, because of the decentralized infrastructure, it does not force departments to integrate their applications into a centralized EAI broker and, therefore, to lose control. It rather allows departments to provide selective access to their business functionality and information, to enforce local policies and, therefore, to keep local autonomy. Iterative integration means that the ESB does not follow an all-or-nothing approach. Because of the infrastructure that is not only decentralized but also highly distributed and versatile, it rather allows to bring all kinds of applications step-by-step to the service bus. Business services can then not only be used in the current integration project but also reused and composed in subsequent projects, below Figure 3.1 shows ESB architecture [1].
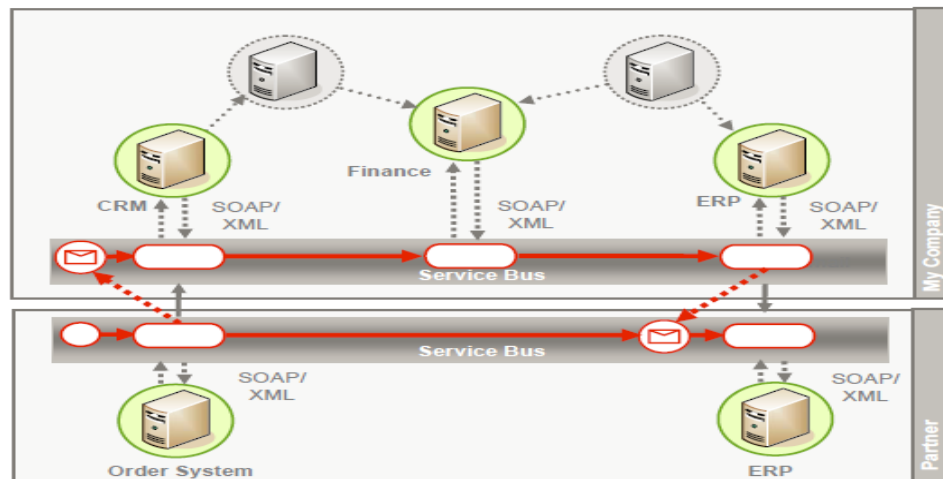

Figure 3.1 - Enterprise Architecture

A concrete ESB implementation fulfilling the before mentioned characteristics provided by SAP is called SAP NetWeaver Process Integration (SAP PI) which was formerly SAP Exchange Infrastructure (SAP XI). The tool is built upon the SAP Web Application Server and is made up of various components shown in Figure 3.2 is a detailed description of them is given below [5]
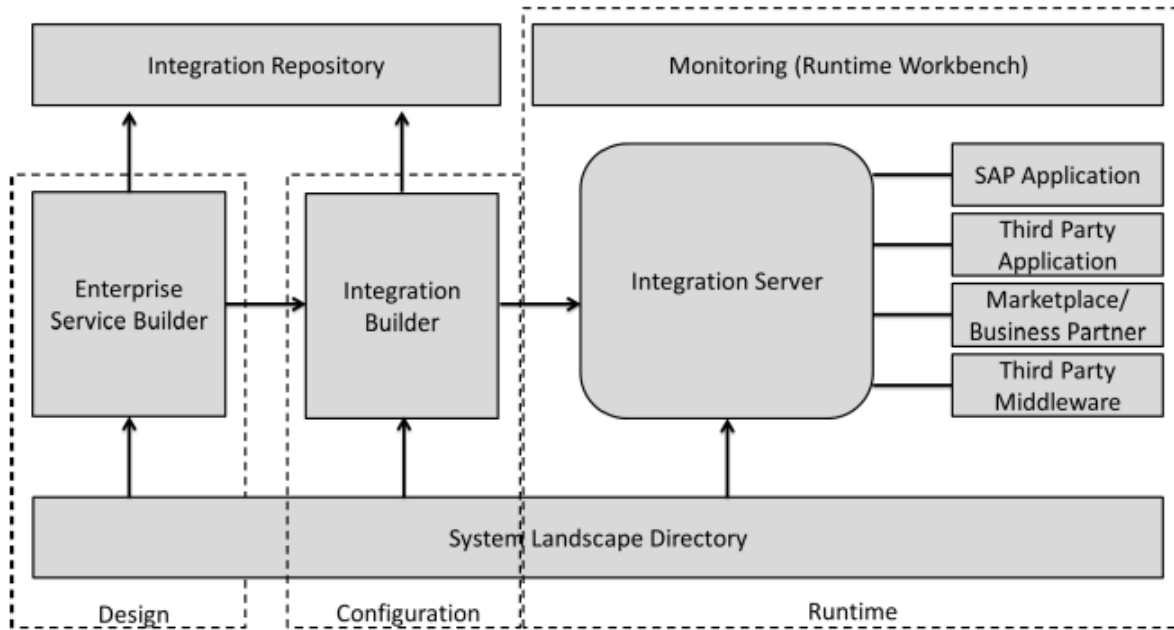
Figure 3.2 - Architecture of SAP

a) **Enterprise Service Repository:** This includes the definition of service interfaces, message types, data types as well as message mappings to specify the transformation between different data formats. More over the SAP PI allows the creation of process flows using BPEL. It has to be highlighted that all the elements are independent from concrete receivers and sender, whereby the link is established in the Integration Builder [5]

b) **Integration Builder**This includes the maintenance of the communication channels as well as the definition of the rules guiding the messages from the source to the target [5].

3.1 Key concepts of Enterprise Service Bus [9]

a) **Message-Oriented Middleware (MOM)** The MOM is basically a highly distributed network of message servers and is, therefore, also called the backbone of an ESB. It allows to establish reliable, secure and manageable virtual channels and to send messages over them. In ESB architecture, a number of special services are available by default. Among these are routing and XML processing services. As the integrated services, they are managed by service containers and connected to certain virtual channels[8]

b) The Service Container: The service container is the means to service-enable all kinds of applications. It is connected to topics and queues provided by the MOM and are able to transform messages into service invocations. It service-enables applications, that are either

managed internally by the container or managed externally and adapted by the container, by providing the business functionality of these applications as loosely-coupled, coarse-grained business services[6]

3.2 Challenges in ESB

a) Technical Challenge Point-to-point integrations create a tangle of webs and interfaces that are difficult to manage and can be easily broken. As the number of integration connections continues to grow for an organization, traditional point-to-point integrations will become increasingly expensive to create and maintain. With the increasing focus on SOA, and the growing connectivity and messaging requirements [11][7]

b)   Organizational Challenge One of the main challenge for the organizations are the skill set of technical team towards the ESB structure, due to less technical skills about ESB technology most of the organizations hesitate to move towards ESB solution. [10]

c)   ESB Customers in UAE SB Customers in UAE During this research a short survey was done with limit to UAE to find out what are the organizations are already into ESB environment and using ESB solutions in their organizations for integration of various applications and services. Below are some sectors highlighted using ESB solutions.

- Most of the Banking sectors are using ESB solutions.
- Services provider organizations are using ESB solutions.
- Healthcare organizations using ESB solutions.
- Most of the Gov. Departments in UAE are using ESB solutions

4. ESB Infrastructure model: This section will describe the standard infrastructure model for ESB, which any organization can adopt if they looking forward for ESB solution but it is not limited it can by scale up and customized as per the organization requirements. This section also highlights the standard model and

the data flow in ESB components with some diagrams and highlight the benefits of ESB solutions.First we have to understand what type of organizations would go with ESB solutions. The organization, which are using multiple application and services in their environments, where large no of transactions and data flow happening on daily basis are fully qualified for ESB

solution. (12) As per current scenario of market there are many organizations running various applications like SQL, ORACLE, .NET, JAVA, etc.
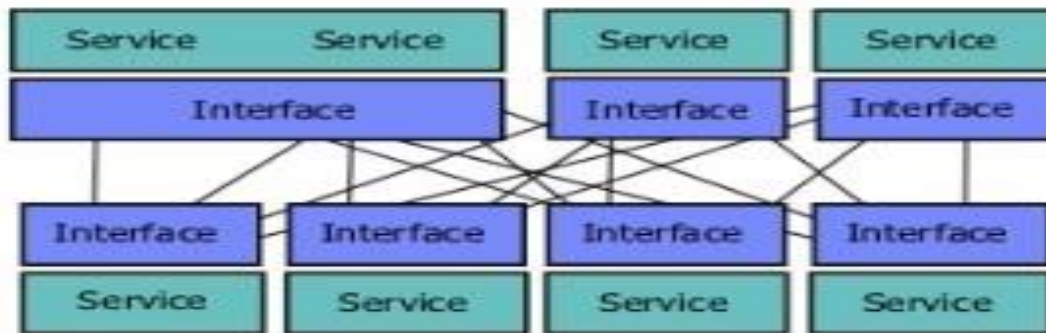

Figure 4.1 - Traditional Application Architecture

The growing of application demand and to keep the business continuity the above complexity is further enhanced into more reliable and efficient architecture in the form of ESB as showing in below Figure 4.2, in other words we say that the current time demands to turn the Figure 4.1 into Figure 4.2
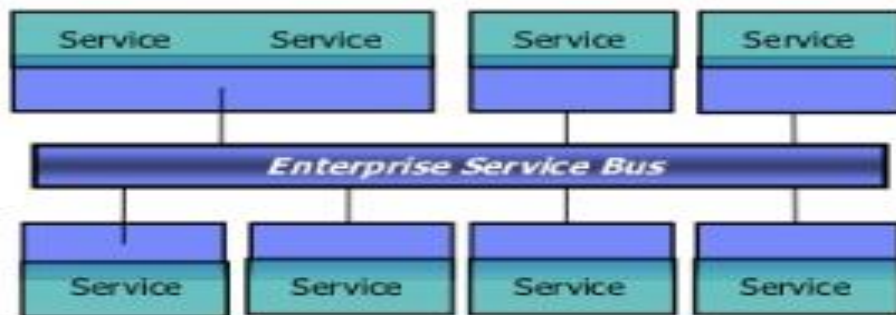

Figure 4.2 - Modern Application Architecture using ESB

4.1 Components of ESB in IIB

- IBM Integration Bus (WebSphere Message Broker).

- Message Flow

- Node Types / Broker

- Queue Manager

After adaptation of ESB solution following are the benefits that the organizations can achieve.

4.2   Benefits of ESB

- The ability of the ESB to convert the messages into a format that is usable by the consumer applications in the form of transformation.

- The goal of ESB is to make integration a simple task and must provide an easy method of monitoring the performance of the system

- The ESB security involves two main components making sure the ESB itself handles messages in a fully secure manner and negotiating between the security assurance systems used by each of the systems that will be integrated

- It is a light weight product

- Easy to expand and scalable with less efforts

- Reduces the cost of maintenance and gets more flexible solution

- Faster and cheaper accommodation of existing systems

- Increased flexibility easier to change as requirements change

5.   Future work: The next generation of EAI Enterprise Application Integration is known as ESB Enterprise Service Bus, there is a lot more to be done on ESB platform to make it more flexible and efficient for the organizations to adopt it without any hesitation and the skill set of ESB should be more available in market so the IT services providers can get more hands on the ESB products. The future work on this would be the IPAAS Integration Platform as a service where the ESB will be more powerful and beneficial for the organizations those are moving toward cloud technology and already the researchers are working on IPaaS.

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