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## Research and Implement on Application Integration Based on the Apache Synapse ESB platform

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### Abstract

ESB(Enterprise Service Bus) is a middleware technology which is a key technology to implement SOA. This paper discusses the relation among the Web Services、SOA and ESB, and also proposes an implementation scheme of application integration based on Apache Synapse ESB platform.

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### 1 Introduction

At present, the major shortcomings of information construction are lack of unified planning, construction level uneven and no unified standard construction in the university's information construction. As no account of the global university departments of general in the original design and development, application system of each college or department do their own way and in them own field, then has formed a lot of information isolated islands. These Colleges and Universities departments urgently need to integrate these independent application systems and their databases in order to realize information sharing.

Application Integration is the key point in the digital campus construction. By using different hierarchical integration technology the platform of application integration links all kinds of information isolated islands to share information、complete internal process integration、reduce resource consumption、strengthen the cooperation between various departments, thus to create more value for colleges and universities.

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## 2 The existing technical route on information integration

There are two kinds of solutions in information integration. One kind is based on data integration technology as the core to construct the new uniform application software platform by the global share data center. Another solution is based on SOA integrated technology. In this mode, the function of software on the network is in the form of services which can be distributed in different physical locations. These services can discover and transfer each other. Because of the loose coupling and platform-independent, they can recombine according to the frequent change of the business demand. This solution not only integrates the existing application system and isolated legacy system according to the change of business need, but also accommodates future increasing and the dynamic changes of the information needs.

### 1.1. *The service integration technology based on Web Services*

Web Services is very suitable for realization of the SOA technology. In essence, Web Services is a self-description Modular Components based on the network and the Distributed. SOA is an architectural style for building software applications that use services available in a network such as the web. It promotes loose coupling between software components so that they can be reused. Applications in SOA are built based on services. In addition, SOA still needs safety, strategy management, reliable information and the support of the accounting system, so as to effectively work. Web Services is not the only technology to realize SOA, but one of the best choice.

### 2.1. *An overview of the ESB(Enterprise Service Bus)*

An enterprise service bus (ESB) is a software architecture model used for designing and implementing the interaction and communication between mutually interacting software applications in SOA. By use of SOAP, XML, WSDL and UDDI it is actually based on message queue to support SOA for distributed computing. Its core functions include message exchange、 service mapping、 context routing communication protocol conversion and so on . ESB provides a basic facilities to go further in decoupling between service provider and consumers, thus make application system has better openness, cooperation and expansibility.

## 3 Digital campus application integration based on Apache Synapse platform

### 3.1. *The overview of Apache Synapse*

Apache Synapse is a lightweight and high-performance Enterprise Service Bus (ESB). In essence Synapse is a web service arbitration frame, it is the building in the Apache Axis2 based. Powered by a fast and asynchronous mediation engine, Apache Synapse supports several other content interchange formats, such as plain text, binary, Hessian and JSON. The wide range of transport adapters available for Synapse enables it to communicate over many applications. Synapse focuses routing, conversion, news based on web services and verified and XML standard registration.

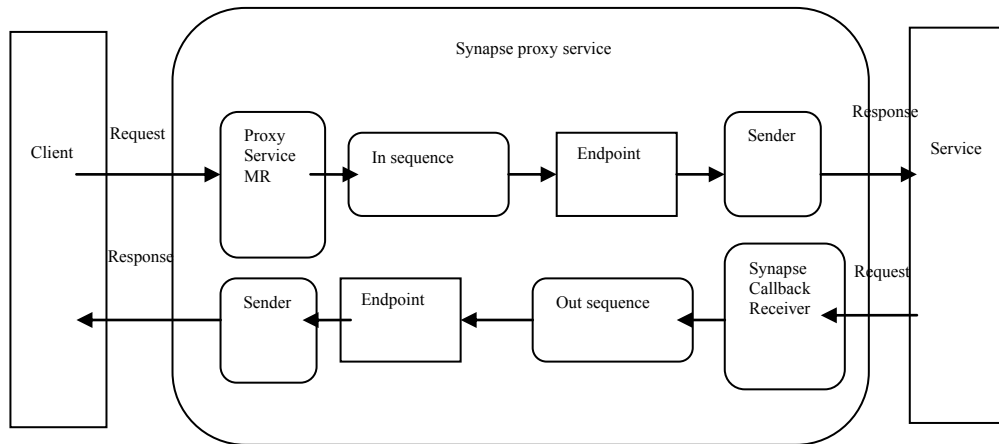


Figure.1 Apache Synapse Proxy Service model

Apache Synapse has a default sequence of actions that applies to any messages that arrive in this way. Techniques like content-based filters (XPath or Regex) can then be used to selectively apply policies to particular messages. As the name implies, a proxy service acts as a service hosted in Synapse, and typically fronts an existing service endpoint. A proxy service can be created and exposed on a different transport and could mediate the messages before being delivered to the actual endpoint, and the responses before they reach the client.

### 3.2. The building of application integration platform Based on Apache Synapse

Apache Synapse is designed to be a simple, lightweight and high performance Enterprise Service Bus (ESB) from Apache. Based on a small asynchronous core, Apache Synapse has excellent support for XML and Web services - as well as binary and text formats. The Synapse engine is configured with a simple XML format and comes with a set of ready-to-use transports and mediators. Everything in the Apache Synapse is a service which can be exposed over variety of transports. ESB services are single method (dowork) services that can be described using interface. An ESB message is somewhat modeled after a SOAP message and consists of several parts, including header, body, properties, attachments, context, etc. Every part can contain a collection (map) of serializable java objects that can be accessed by name.

Through the network of internal virtual URL mapping for real URL, Synapse can make the enterprise hiding internal infrastructure details and unifying addressing scheme for external system maintenance at the same time. The same internal organization model can be used to provide a clear and manageable the bus level service.

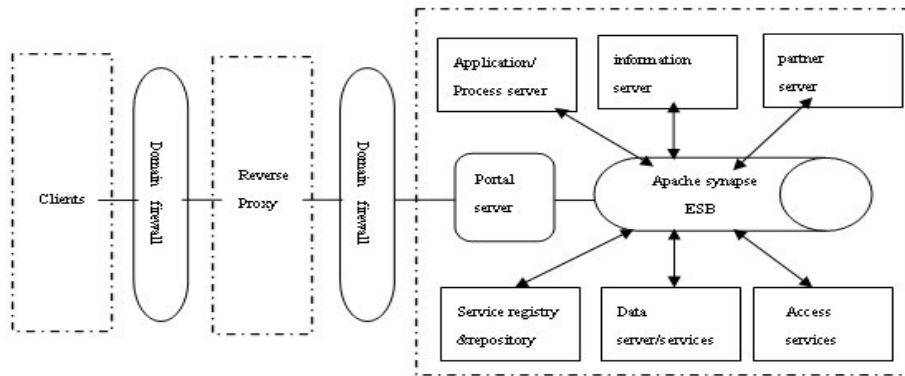


Figure2 application integration based on Apache Synapse platform

Apache Synapse has been designed to support very fast XML routing with a streaming XML design based upon Apache Axiom. In addition, the use of a completely asynchronous architecture and non-blocking IO ensures that Synapse has very low overhead and can scale to support thousands of concurrent clients without dropping messages. Synapse provides the consistent model for management strategies and service. Through the will Synapse as layer, such as identity authentication, the verification, the log and aspects, load balance and so on can be controlled. This makes organization be more efficient and more effective management resources. Finally, Apache Synapse will convert the existing application systems into web services, information portal presents information from diverse sources in a unified way and provide unified access control for different users though the standard application interface.

### 3.3. The development environment and deployed

Apache Synapse is free and open source software distributed under the Apache Software License 2.0. The latest version of Synapse is v2.1. This release comes with a horde of new features, bug fixes, performance and stability improvements. Different from Axis2, Apache Synapse is not a programming environment. Instead, it is through the XML Configuration files (for Synapse) or the graphical user interface (WSO2 ESB speaking) for allocation and management.

Based on the content of the message routing. Matching of a SOAP message "To" attribute value, will meet the conditions of the request To the end of the forwarding designated processing. Reliable information interaction through the WS-RM in the synapse and service provider realize the interaction between reliable information.

```

<definitions xmlns="http://ws.apache.org/ns/synapse"> <in>
  <RMSequence single="true" version="2.0"/>
<send> <endpoint name="reliable">
<address uri="http://localhost:9000/tsc/*****"> <enableRM/> <enableAddressing/>
  </address> </endpoint> </send> </in> <out>
  <header name="*****" action="remove"
xmlns:wsm="http://schemas.xmlsoap.org/ws/2012/02/rm"/>
  <header name="*****" action="remove"
xmlns:wsm="http://schemas.xmlsoap.org/ws/2012/02/rm"/> <send/> </out>
</definitions>
  
```

As a mediator the Apache Synapse can read and modify the message encapsulated in the MessageContext in any suitable manner which is adjusting the routing headers or changing the message

body. In addition through the Synapse API custom intermediary (realize org. Apache. Synapse. Mediator interface) it realizes the transmission of the news of the access and control.

#### **4 Conclusion**

The Apache Synapse ESB is a robust, lightweight and highly scalable and distributed open source Enterprise Service Bus. It supports SOAP Web services as well as Legacy services. Using Apache Synapse ESB as the bus type agent can flexible configurate different service from heterogeneous system and realize cross-node application integration accessible. Through the intermediary or convert current service, Synapse ships with a large collection of mediators that can be used to implement even the most complex enterprise integration scenarios.

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