

WS-BPEL Monitoring System

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Abstract – After the appearance of Web 2.0, application areas of the Web are facing new situation because of the WS-BPEL, which has been standardized since 1990. However, the Web technology needs to be compensated, since the Business Process is too complicated to be maintained. In this paper, the design and implementation of Log Viewer, which is for effective follow-up service of the Business Process, is proposed.

Index Terms—E-Commerce, WS-BPEL, Business Process, Monitoring

I. INTRODUCTION

As it is compared with the past, ranges of the corporation activities have been broadened and the management conditions are changing so fast. As the business is automated and complicated, it did not stick on fixed process but accepted the Business Process Management that constantly reflects flexible work-flows. Thus, the business over whole management faced new situation, which was represented by the automation. Through the automation, each work became not to be missed its essentials to be processed, since they are controlled by their own processes, and relevant work flows also became easy to be grasped.

To be more comparative than other information systems, however, it would rather be serviced through interactions with other businesses than its own. Thus, the harmonious interaction became the most important factor of the Business Process Management for the integration of businesses that are conducted in all different circumstances.

In 1990, the Business Process, which was a term of the management area, was also started to be used in IT area. The Business Process is applicable to overall production fields including software, as well as to traditional work areas. This automates processes, so that it continues to be applied to various areas to reduce the cost of maintenance and production. So, the integration among businesses in difference circumstances or systems became the most important issue of the Business Process Management.

To improve interoperability among mixed conditions, the XML (eXtensible Markup Language) of Business Process has been adapted.

The XML is a standard text format, which has been designed to transmit formatted documents over the Web [2].

Thus, the XML became the main path to exchange data

among heterogeneous systems in the Business Process.

The interaction among systems based on XML is mainly spread by the international standard organizations, and also widely used in e-commerce area, such as ebXML (electronic business XML). Recently, it also brought about a new concept, named Web-Service.

Recently, an execution language, WS-BPEL (Web-Services Business Process Execution Language), which can control the interactions among Business Processes based on XML, has been introduced, and it became a standard to model activities of e-commerce or overall corporation management and to automate them. As stated, the WS-BPEL provides the modeling to extend existing Web-Services with new services [1]. As the Web Services evolve, the Web Service Program can involve programming executed by large groups of people or by small groups over long period of time [3]. Usually, programs in large groups become difficult to be changed [3]. So the importance of monitoring to maintain WS-BPEL came to the fore, and methods to improve programs through feedbacks of failed and successful Web-Services are researched. In this paper, the implementation of log analysis program, which supports analysis of log messages printed by practical systems, is proposed as one of the supporting techniques for WS-BPEL monitoring. With the proposed method, the maintenance of existing WS-BPEL program can be supported by feedbacks.

II. BASED STUDY

A. Web Service

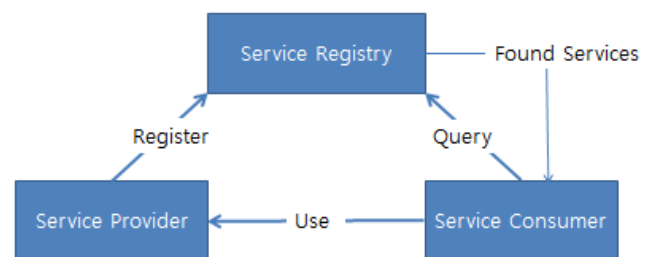


Fig. 1. WS-BPEL Organic Combination

The Web Service means a software system, which has been designed to support interactions of shared devices through the network. Though the definition of Web Service defined by W3C, which suggested the standard of Web Service, embraces so various systems, the Web Service generally means clients and servers, which interacts through XML messages based on SOAP (Simple Object Access Protocol) standard. In other words, it is a technology to enable interactions among systems using XML based standard messages and SOAP without being

subordinated to platforms or applications.

The Web Service consists of three standard technologies, such as WSDL (Web Service Description Language), SOAP (Simple Object Access Protocol), and UDDI (Universal Description Discovery and Integration). Based on these open standards, the Web Service is implemented with organic combinations of Service Provider, Service Registry and Service Consumer. [Fig. 1] shows the organic combination. The Service Provider creates Service Specifications and publishes it to service registry. Also, the Service Provider receives Web Service call messages from more than a consumer, and returns results after conducting services. The Service Consumer finds Service Specifications that are registered to more than a Service Registries and it also searches Service Specifications provided by Service Providers from Service Registries. Then it calls or binds the services. In UDDI, provided Service Specifications are managed in formats of directories to be searched and used from service registries.

B. Business Process

Not only in corporation process but all so in software, small processes of activities and tasks belonging to frames of overall

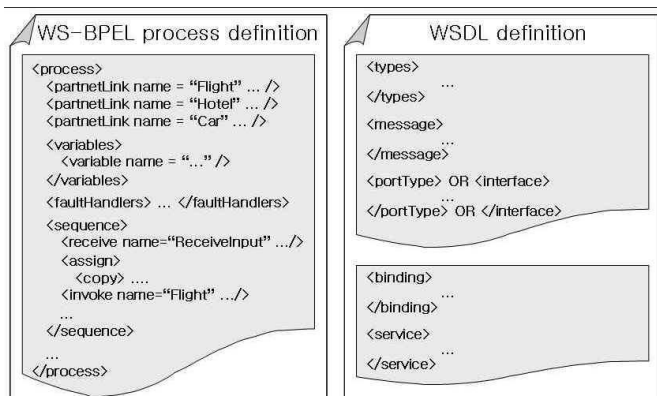


Fig. 2. WS-BPEL Structure [1]

processes create results in harmony. These procedures are called the Business Process. Extending the original meaning and combining it with IT, procedures of activities and tasks in the Web are systemized as processes and form Business Process. Every work is divided by the perspective of Business Process, and a new Web Service is also regarded as a process through the interface, so that it is easy to be extended and simple to be maintained in terms of total process management.

Business Process starts from setting the goal and it finishes its life cycle with accomplishing its goal after conducting promised processes. A business process can be composed of multiple business processes. Also, each business process has an interface, so that it can be applied to other Web Service whenever it is required.

The Business Process has four characteristics such as data dependency, exceptional condition, recovery method, and result coordination. The data dependency means changes of procedures when the data of current process is changed. The exceptional condition should define exceptions when necessary data does not exist during procedures, and recovery methods are

also required to handle these exceptions. The last characteristic, result coordination means interactions among various results from different business processes to retrieve the proper result.

C. Business Process Execution Language

The WS-BPEL describes service composition as a unit of process using descriptions of WSDL (Web Service Description Language). [Fig. 2] shows the structure of WSDL, which defines the process of WS-BPEL [1].

OS	Windows7 64bit Ultimate
Java Version	JDK 1.7_20 64bit
IDE	Eclipse 3.7.1 Indigo

Table 1. Development Environment

The <partnerLink> of WS-BPEL defines participation services and the <sequence> describes activities to be processed in sequence.

Since the WS-BPEL describes detail execution flows of services, it can shows sequences of overall services and flows. Thus, many of existing researches utilizes WS-BPEL to carry on tests of SOA (Service Oriented Architecture).

III. BASED STUDY

A. Environment

The implementation condition consists as following table.

Additionally, a log file of 100MB that has been recorded after execution of WS-BPEL has been utilized.

B. Log Viewer for WS-BPEL Issues

To implement the Log Viewer specified for WS-BPEL, there should be several discriminating points with existing log viewers.

First, the WS-BPEL is an Execution Language based on the Web Service composed of Client-Server, so that many systems are executed on server side. So the logs are also saved on the server, and log files on the server should be browsed through FTP.

Second, among WS-BPEL execution procedures, there are not only simple activities but also usages of complicatedly structured messages such as XML and SQL, thus it shows poor performance when they are read by general log viewer programs. So, it should be improved.

C. Log Viewer for WS-BPEL Design

[Fig 3] shows overall structures of WS-BPEL Log Viewer. The DSP Loader that parses main components, Table Manager, which manages table to show printed logs, and messages including SQL and XML because of the characteristics of WS-BPEL, includes the Converter Manager to parse messages and the Validate Manager to test sanity of log file conditions. Also, log files are created on the server, since the WS-BPEL usually conducts on the server. Thus, the log files, which are results of processes on server side, can be monitored by FTP

manager that enables reading of logs through FTP.

When a file is selected through FTP Manager or on the local storage, the start and end conditions are used to search through DSP Loader, and parsing result of log files that satisfy search conditions are displayed on the table. If contents of the log file are too complicated, it will be transformed with Convert Manager and displayed in easy format to users. All of these results are displayed on the table and they are managed by Display Manager.

IV. CONCLUSION

The Business Process, which is to manage corporation work by each process, has evolved and applied not only for company management but also for Web Service and Software. As the Business Process constantly develops, it requires more efficient methods of the maintenance. So the monitoring of executed processes became an important issue.

In this paper, the implementation of Log Viewer for WS-BPEL, which includes essential components viewing logs for analysis of WS-BPEL, is proposed. The proposed program enables monitoring of follow-up maintenance for WS-BPEL with analysis of log messages. The WS-BPEL can be managed more efficiently with proposed method and inside of process that is covered with black box in SOA also becomes reviewable.

The format, Log4J that is applied for most of WS-BPEL has inappropriate output format for WS-BPEL. Thus, more researches to built database framework, which monitor many services in the Web, are required.

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