Integration of Management Information System Using Business Process Management (BPM) and Service Oriented Architecture (SOA) in the Service Cloud

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Abstract: In recent years, global interaction allowed a company to respond quickly the changes in business environment. This results in the information technology that used by companies to meet their business needs. Information technology should be more flexible and agile in adapting to business changes faster. Required a method of information system to facilitate the needs of companies, not only to improve services to customer but also to improve the optimization of information system that have been integrated with each other. Business Process Management (BPM) is using Service Oriented Architecture (SOA) to improve the alignment between business and information technology. With presence of cloud computing services, information technology development no longer expected to be a complex configuration techniques, to let companies more concentrate on their business activities. This research resulted in a framework of business process management and also an architectural model of integration among SOA based application which can be accessed using cloud computing. In addition, this research also produced a prototype of human resources services, warehouse services, and point of sales using windows communication foundation (WCF) technology. ISO 25010 is used in this research as a evaluation method of system integration design.

Keywords: Business Process Management (BPM), Service Oriented Architecture (SOA), Software As A Services, Windows Communication Foundation (WCF), ISO 25010.

1. INTRODUCTION

The development of information technology is increasingly growing. This gives the changes in various fields including business world. The business enterprise must always adapt to the environment of the business development in the current era of globalization if it does not want to be left with its competitors.
Advances in information technology and information systems allow companies to interact and collaborate with stakeholders, coworkers, and customers on a global scale. By utilizing information systems and information technology, the company can quickly respond to changes in the environment and utilize new methods for introducing products and services into various global markets. To cope with the interests of changes and challenges of business, the company invested heavily in the development of information systems and information technology. The new technology is expected to provide new methods, frameworks and technology infrastructure that company’s integrate and implemented to gain agility and flexibility also can adapt quickly within the scope of their information systems or technology. The problem faced in developing this technology is how to carry out the distribution of information between information systems in a variety of ways between the technology and the language so as not to cause inconsistency of information everywhere across an enterprise[2].

In recent years, Business Process Management (BPM) using a Service Oriented Architecture (SOA) has proven to be one of the best approach to enable alignment of business environment with information technology[1]. With cloud computing services could be one of alternative saving solution for information technology use for enterprise and business environment. The cloud computing services also offers the company to concentrate on business activities and the development of information systems rather than on technical configuration of complex devices[6]. A small and medium scale enterprise which is being grown in Indonesia in line with the company’s growth in this era of globalization plans to invest in information technology in order to be aligned with their business processes. The Information systems which run today on the company were not able to support the business needs of companies, and therefore this research tried to carry out the implementation of BPM, SOA and cloud computing services to implement the integration of information systems that can align the business processes to accelerate the adaptation of business processes that can compete in the global market. The problem is limited to the application prototype integration of information system related to the sales process. Based on the background, this research focuses on how to design a prototype for integrating information systems based on the model of the business processes of companies in the cloud computing services that offer a solution for information systems which have been less meet the needs of companies to become more organized with a system based Service Oriented Integration.

2. LITERATURE REVIEW

2.1. Business Process Management (BPM)

Business Process Management is a management discipline that focuses on the use of business processes as a significant contributor to achieve the organizational goals through the improvement, ongoing performance management and governance of critical business processes. Not just a software, not only improve or reverse the process but also on the issue of managerial, not temporary but is part of the management and not only made the model but also undertake the implementation and execution of these processes, which require analysis[4]. BPM involves the concepts, methods, and techniques to support many processes in running the business processes, such as design, administration of the configuration, rules, and analysis[9].
2.2. Service Oriented Architecture (SOA)

SOA is an architectural style of system that create and use business processes in the form of service packs throughout their life cycle. SOA also defines and determines the architecture of information technology (IT) that can support a variety of applications to exchange data and participate in business processes. SOA supports the integration of the business by creating a type of assignment or the related services and reusable. SOA is to achieve business agility, the agility has several important factors: the change, the speed of change and quality of the change. Agility of Business enables the company to respond changes of time, and thus win market competition[5].

2.3. Windows Communication Foundation (WCF)

Windows Communication Foundation (WCF) is a features combination of Web Services, Remotes, MSMQ and COM+, which is framework for building service-oriented applications[7].

2.4. Cloud Computing

Cloud Computing is a client-server model, where resources such as servers, storage, network, and software can be viewed as a service that can be accessed by remote users every time. Users can enjoy a wide range of services provided by the provider of cloud computing, without the need for too much requested technical assistance from the provider[9].
2.5. Design Evaluation ISO 25010

Software quality can be assessed through measurements and certain methods, as well as through tests software. One measure of the quality of the software is ISO 25010 established by the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC). ISO 25010 replaces the previous standard ISO 9126, which since 2001 become a standard benchmark quality analysis software. ISO 25010 model characteristics include functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability.

3. DISCUSSION

Issues will be examined follow the life cycle of BPM using a BPM framework. Using a BPM framework, researchers can analyze the problems being faced in a company. There are four main components to the BPM solution, that is Modeling, Integration, Monitoring, and Optimization. Researchers will divide into seven steps into a framework of BPM:

1. Strategic Planning and Organization.
5. Service Modeling.
7. Monitoring and Management.

3.1 Strategic Planning and Organization

At this stage will describe the problems and set goals strategy clearly to be used in research that is being done. Determining the strategy using strategy analysis Strength, Weakness, Opportunity and Threat (SWOT) based on the identification of strategies and interviews with users and stakeholders and also observe the business processes that are currently running. The results obtained are by using cloud computing services, it can reduce the expenditure of the information technology devices. With information technology development using service oriented which having good characterization of align business processes with the process business execution using information technology.

3.2 Identification and Requirement Specification Process

At this stage the researchers identify the specification process by analyzing data obtained from interviews, documentation, and observations of the company in order to get the specification of functional and non-functional requirements of users.

3.3 Business Modeling

At this stage, researchers will identify the gap between business processes that are running with the expected business process solutions. This is done in order to see the problems of business processes that are running in order to make changes to business processes to be developed. In the solutions business process development using the concept of collaboration between BPM and SOA methods as an overall framework.
Process implementation that have been designed with SOA infrastructure
Services that is exposed using various processes
BPM Model, Simulation of Review Process Design
Monitoring of Performance for analysis improvement
Service change will not influence the process. Process change using again range of needed services
SOA Infrastructure, business process orchestra and services providers mediation

SOA and BPM collaboration results in this research can be explained as follows:

1. Using BPM will determine the strategic planning that has been passed, ongoing and will be done in the future.
2. Using the SOA will be creating a service-related business processes to be performed.
3. Customer ordered and will be accepted by the POS Information system as sales order.
4. Will do the addition of the human resource information system to monitor operational processes (log system) systematically.
5. Will use cloud computing services to be able to access the information outside the office network in order for reporting runs fast and accurate.

3.4 Business Process Modeling

Every business processes that have been identified will be modeled using Business Process Model and Notation (BPMN) so as to obtain a business process diagram. Modeling business processes that created them are:
1. **Purchase Order**

In this business process modeling there is integration between information systems inventory with information systems Human Resource (HR), HR system added monitoring process that will oversee the activities of users of information systems.

2. **Purchase Receipt**

In this business process modeling are the same integration model with the purchase orders.

3. **Sales Order**

In this business process modeling there is integration between information systems inventory, POS and HR. POS can view availability information of stock from inventory system and HR can monitor user activity in running the POS system.

4. **Delivery Order**

In this business process modeling POS may deduct the amount of stock contained in the inventory system using a service that will be created. HR system can still keep an eye on the activities carried on this business process.
5. Payment Order

In this business process modeling there is integration between HR systems and POS. HR can monitor activities of payment orders placed by users of POS systems.

6. Monitoring System

In this business process modeling HR system can receive activities carried out by the inventory system and the POS system.

3.5 Service Modeling

Modeling service is done to identify and define the services that will be made. The aim is to ensure that the service is designed in accordance with the requirements discussed earlier and ensure that each service has a clear appropriate function. In this research, there are several services that can be developed including monitoring employee services, inventory services, reporting services. Every major services have other services in the primary service or called nested service that is a service that has inheritance from one of the primary services.

3.6 System Development

At this stage the researchers will use the Scrum software development method. This method is selected based on strategy of the company’s business process management. The company requires short-term development and gradually to improve the service in accordance with the state of the business experienced by the company. By using the Scrum method on system development, allowing researchers to explain easier the development of systems to the companies that have appointing a representative to be a resource in the development of this system integration. The results obtained backlog include system integration infrastructure model, architecture models Cloud Service, and prototype integrating enterprise information systems based on UML that have been made.
3.7 Monitoring and Management

Monitoring and management is carried out after the integration of fully developed. At this stage will be done a test for the prototype system integration that has been made, this is done to determine the ability of system integration is already in line with the needs of users and as retroperspective to improve further system development on company. Testing plan to be performed using black box method for functional testing and methods of User Acceptance Test (UAT) for acceptance testing the system. In addition to testing the system performed well evaluation software design to determine the feasibility of standardizing systems that have been created using the model of ISO 25010. Black-box testing designed to validate functional requirements without the need to know the internal workings of a program. The test results that have already been designed before which is the functional plan of the client side system associated with communication between existing information systems.

For user acceptance testing (UAT) of the system will be performed by employees of the company as a tester. This test is used to determine whether the system integration meets the criteria that users need related to a business process that is being developed. This testing is done after the functional testing (black-box testing) is completed. This is done so that when users use the real data will not be functional errors. ISO 25010 has eight (8) characteristics but only five (5) characteristics are used as variables in this research are functional suitability, usability, maintainability, security, and compatibility. Evaluation is done by analyzing the characteristics that are used as variables in the research and the results of the respondents who participated in the testing method ISO 25010 are as many as 10 people consisting of 8 employees information system users and 2 software tester non-employee. The results of the evaluation of the design can be seen in the following table:

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional Suitability</td>
<td>650</td>
</tr>
<tr>
<td>Usability</td>
<td>600</td>
</tr>
<tr>
<td>Maintainability</td>
<td>500</td>
</tr>
<tr>
<td>Security</td>
<td>700</td>
</tr>
<tr>
<td>Compatibility</td>
<td>650</td>
</tr>
<tr>
<td>Total</td>
<td>1513</td>
</tr>
</tbody>
</table>

Based on the above table it can be concluded that the design of the overall system integration information has actual score of 1513 out of the ideal score of 1800 so that can enter into the criteria very well (84.35 percent). This proves that the evaluation of the design of the software produced by five (5) criteria of ISO 25010 is very good and deserves to be implemented.
Table 1
Results Evaluation Design ISO 25010

<table>
<thead>
<tr>
<th>Aspec</th>
<th>Actual Score</th>
<th>Ideal Score</th>
<th>% Actual Score</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functionality Suitability</td>
<td>273</td>
<td>300</td>
<td>91%</td>
<td>Very Good</td>
</tr>
<tr>
<td>Usability</td>
<td>451</td>
<td>550</td>
<td>82%</td>
<td>Good</td>
</tr>
<tr>
<td>Maintainability</td>
<td>382</td>
<td>450</td>
<td>84.88%</td>
<td>Very Good</td>
</tr>
<tr>
<td>Security</td>
<td>282</td>
<td>350</td>
<td>80.57%</td>
<td>Good</td>
</tr>
<tr>
<td>Compatibility</td>
<td>125</td>
<td>150</td>
<td>83.33%</td>
<td>Good</td>
</tr>
<tr>
<td>Total</td>
<td>1513</td>
<td>1800</td>
<td>84.35%</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

4. CONCLUSION

The results of this research obtained a framework for Business Process Management (BPM) integrated by a Service Oriented Architecture (SOA) and could be run on a cloud computing services at a certain company. The design of this research is a framework that can be used as a reference for the development of information systems or the integration of information systems. This research also produced three (3) SOA service models, the inventory service, Point of Sale service, and Human Resource service. In addition to the framework of BPM and SOA models in this research also produced a prototype of integration information system that is created using the Scrum method development system as the application of the theory that has been made. Implementation of information systems integration using SOA created using the windows communication foundation (WCF) service. Evaluation software design using standard of ISO 25010 in this research got a good results and can be implemented. ISO 25010 is a standard evaluation software suitable for service oriented architecture model.

REFERENCES