

# Implementation of Service-Oriented Architecture Licensing of Government by Using BPMN 2.0 SOA-BPM BPMS Oracle 11gr1

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**Abstract**—The Government's licensing service business processes involving many stakeholders with different information technology systems and platforms are always evolving need to approach the implementation of systems and information technology to link a variety of stakeholders in the integrated licensing services, through the development of web service and web service ID CARD payment. Integrated main system licensing services application developed using Oracle SOA-BPM BPMS version 11gR1 with tools BPMN 2.0. All things related to the integrated system, i.e. roles (roles in the system), user interfaces, business rules engine, various conditions gateways, adapters and file components, etc. The application is compiled using Oracle JDeveloper and uploaded (deployment) to Oracle Weblogic SOA-BPM Server, so the development model and implementation of SOA-BPM with BPMN 2.0 can be created.

**Index Terms**—BPMS, SOA, BPM, Web Service, BPMN 2.0, Oracle SOA-BPM

## I. INTRODUCTION

Implementation of licensing services that is simple, clear, secure, transparent, efficient, economical, equitable and timely to the public, is the principle of excellent service that the government held [1].

Challenge business processes evolve and change with the times require and information technology systems that can integrate all of the components that have good interoperability and can be developed in agile and reusable. Therefore, it will use Service Oriented Architecture (SOA) that orchestrate the required service component, and the use of BPMN 2.0 process model for the implementation of government licensing business [2] [3].

The entire design process model, as well as the implementation of SOA and BPMN 2.0, is implemented on single development tools, namely BPMS (Business Process Management Suites) Oracle SOA-BPM 11gR1.

## II. LITERATURE REVIEW

SOA is an architectural framework for designing software that has the concept of services and is more service-oriented architecture components.

The impact of the SOA as follows [4]:

1) Application Architecture: services requested by the application business process or integration process or portal.

2) Enterprise Architecture: enterprise architecture Components for the handling and management services, such as orchestra service for business processes or composite applications using services, bus service to request service mediation and translation protocols and formats.

3) Business Architecture: organizing or modify business activity for SOA implementation adjustment.

4) Architecture Organizations: roles, responsibilities, and governance in the organization, which deals with the activities of the SOA.

Many parties that define SOA in some aspects where there are similarities and differences as follows:

First, the definition of SOA by Gartner [5], "Service Oriented Architecture (SOA) is an approach to software design client-server where an application consisting of software services and software service consumers also known as clients or service requesters. SOA differs with the model client/server in General where the definition of SOA is emphasized on the software components are loose coupling using interfaces that separate and stand alone.

Second, the object Management Group's (OMG) SOA Interest Group [6] defines SOA as a "Service Oriented Architecture, a style of architecture for the community of providers and consumers of services to reach a value of (i) allow participants in a community to work together with minimal co-dependence as well as the dependence of the technology, (ii) the Organization, people and technologies must comply to have been determined within the framework of its participation in community (iii) provide value to business processes and realized by

the community, and (iv) allow the various technologies used to facilitate interaction in the community. "

Design principles of Service Oriented Architecture (SOA) [2], is a guideline to form the logic solution in a manner and specific objectives, as follows:

- 1) Standardized Service Contracts
- 2) Service Loose Coupling
- 3) Service Abstraction
- 4) Service Reusability
- 5) Service Autonomy
- 6) Service statelessness
- 7) Service Discoverability
- 8) Service Composability

Because of the breadth and depth of the BPMS, a larger vendors middleware platform, fit to take on the challenge of BPMS, then this study will use one of the tools that exist within the Gartner's survey report [11]: "Magic Quadrant for Business Process Management Suites," survey and analysis of the top 25 BPMS vendors, and the author will use is the one that exists in the leaders quadrant i.e. Oracle SOA-BPM Business Process Management Suites [BPMS] 11g.

### III. CASE STUDY

Development of models of SOA-BPM Government Licensing with BPMN 2.0 and implementation on BPMS Oracle SOA-BPM 11gR1 will model and implement licensing system retribution and non-retribution in accordance with the Government. But because of the extent of the Government's licensing system, then it will be restrictions at an angle of implementation that will be described next.

Implementation and testing of SOA-BPMN 2.0 on this research use software BPMS (Business Process Management Suite) – Oracle SOA-BPM 11gR1. In this study, application development SOA-BPM using Oracle JDeveloper software, which is an Integrated Development Environment (IDE) Oracle SOA-BPM.

In Gartner Research Reports study in 2010 [11] on BPMS (Business Process Management Suite), software BPMS Oracle SOA-BPM included in the Leaders Quadrant, which is highly regarded and reliability in the industry accounted for SOA-BPM.

Specifications Software Development and Implementation, detail of software development and implementation case studies using the software as follows:

- 1) SOA : Oracle SOA Suite 11.1.1.6.0
- 2) BPM : Oracle BPM Suite 11.1.1.6.0
- 3) SOA-BPM modeling: Oracle JDeveloper 11.1.1.6.0
- 4) SOA-BPM server: Oracle Weblogic 10.3.3.0
- 5) Database: Oracle Database xe 11.1
- 6) Oracle Enterprise Content Management 11.1.1.6.0
- 7) Webcenter : Oracle Webcenter 11.1.1.6.0
- 8) Java SE : Oracle JRockit r28.2
- 9) Java SDK : Oracle Java SDK 1.6.0\_29-b11

But because of the extent of the Government's licensing system, then the process of design and

implementation in Oracle BPMS machine SOA-BPM it just discusses the two permissions processes (location and disturbance). Modeling and develop forms of users, until the groove of roles disposition, business rules service to retribution rules of disturbance permission, and use two web service reference to the data request ID and request the status of retribution. Then use the 4 file adapter service to save the final result four different directories licensing process (store location permission process a success, the process of location permissions canceled, the process Permissions the successful disruption and nuisance Permission process canceled). This is done with BPMN 2.0 models with the flow as follows:

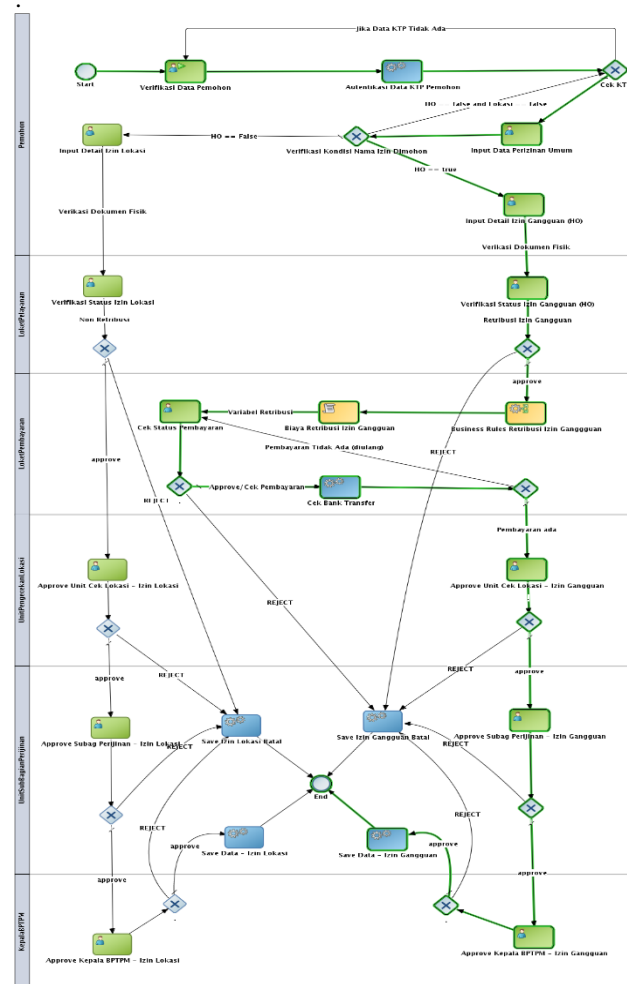


Figure 1. Design Model BPMN 2.0 Licensing Government for Location and disturbance Permission

Stages of Representation Orchestration Service Layer Government permissions model as follows:

#### 1) Orchestration Service Layer

On the development of applications using Oracle JDeveloper BPMN, all business process flow with roles as well as the respective roles of swimlanes in it including all the components of the activity interacts with other BPMN components such as gateways, exclusive, business rules, and service. BPMN business process flows with all the components therein are implemented as follows:

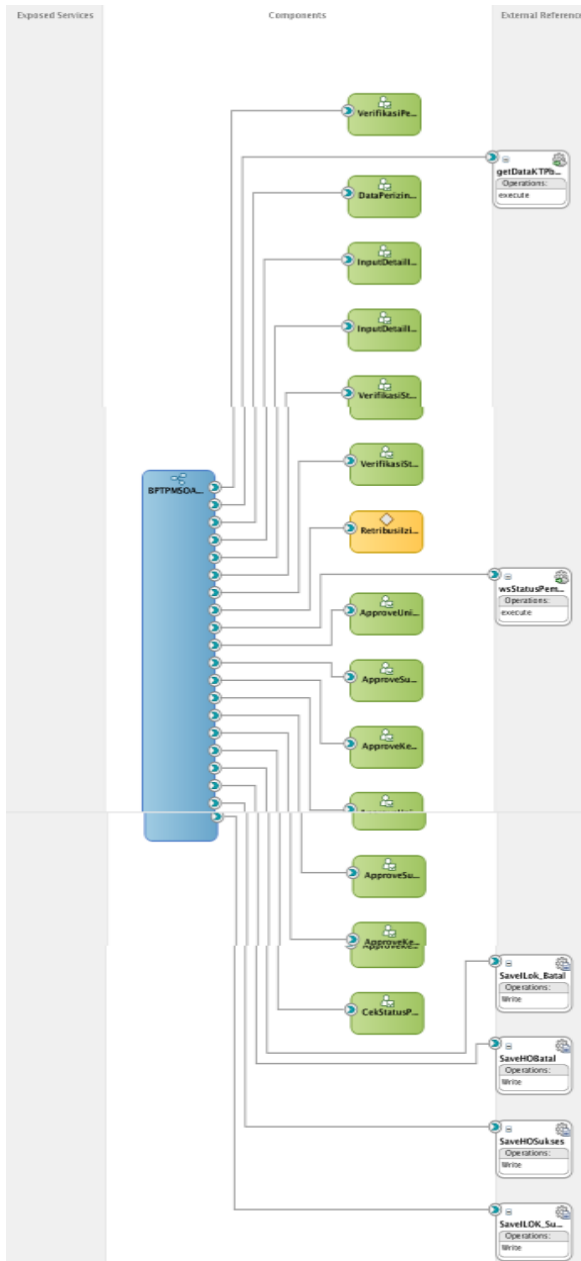


Figure 2. Implementation Orchestration Service Layer with Business Layer and Application Layer

## 2) Business service layer

On the implementation of the web service will be developed in two web service that will support this system: Web Service wsKTP: to query ID Card.

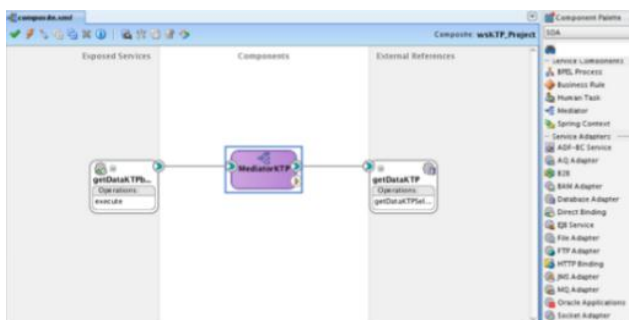


Figure 2. Webservice wsKTP: getDataKTPbyNIK.wSDL

Web Service Payment Status: to query payment permission data



Figure 3. Web Service wsPayment Status: Wsstatuspembayaranizin.wSDL

## 3) Implementation of business rules service

In the implementation of this system, business rules used to retribution fees logic of disturbance permission (HO). Oracle Business Rules is a component that can change business logic without having to make the process of compiling and deployment.

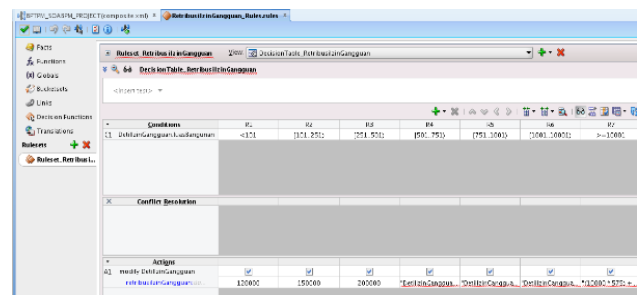


Figure 4. Implementation Business Rules Service Retribution

## 4) Implementation file adapter service

File Adapter Service is used to store the results of the final Permission consists of four file as follows:

1. File Adapter Service SaveHOBatal.wSDL,
2. File Adapter Service SaveHOSukses.wSDL,
3. File Adapter Service SaveILOK\_Batal.wSDL,
4. File Adapter Service SaveILOK\_Sukses.wSDL

## 5) Implementation of Human Tasks Service

Implementation of human tasks are meant to develop the software interface to users, each component activity in the diagram BPMN configurable enter and output as well as do the Auto Generate Form Task to generate user application then each application form is uploaded (deployment) to the server Oracle Weblogic SOA-BPM.

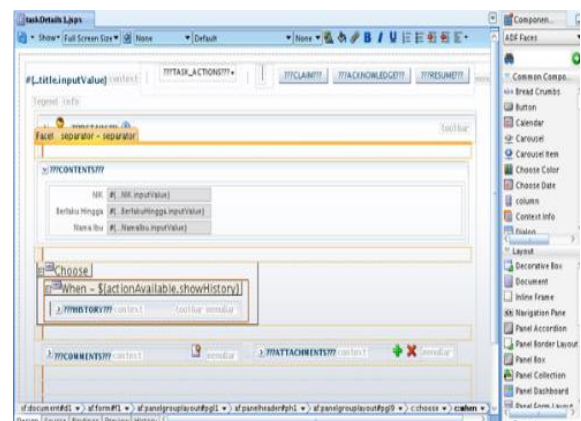


Figure 5. Design Verification Task Form Applicants

## List implementation of human tasks service

1. VerifikasiPemohon.task
2. DataPerizinanDimohon.task
3. InputDetailIzinGangguan.task
4. InputDetailIzinLokasi.task
5. VerifikasiStatusIzinGangguan.task
6. VerifikasiStatusIzinLokasi.task
7. CekStatusPembayaranIzin.task
8. ApproveUnitCekLokasi\_IzinGangguan\_UI.task
9. ApproveUnitCekLokasi\_IzinLokasi.task
10. ApproveSubagPerijinan\_IzinGangguan\_UI.task
11. ApproveSubagPerizinan\_IzinLokasi\_UI.task
12. ApproveKepalaBPTPM\_IzinGangguan\_UI.task
13. ApproveKepalaBPTPM\_IzinLokasi\_UI.task

The next tables are the explanation process of development and implementation result using Oracle JDeveloper SOA-BPM appropriate forms of visual development which have been described previously

TABLE I. WEB SERVICE IMPLEMENTATION PROCESS

No	File name	Information
1	getDataKTPbyNIK.wsdl	The web service is used to verify the data of ID card applicants who are always included in each licensing application process. In the implementation, the SOA components web service mediator associated with the SOA database components and associated with the SOA components connected to the Oracle database used to store master data ID.
2	wsStatusPembayaranIzin.wsdl	The web service is used to verify the applicant's payment data. In the implementation, the SOA components web service mediator associated with the SOA components associated with the SOA database components connected to the Oracle database used to store master data Payments applicant who has paid the appropriate permission retribution applicable requirements.

The following table is a file the results of the development and implementation of BPMN and SOA using Oracle JDeveloper SOA-BPM, SOA, and BPMN orchestration is as follows:

TABLE II. FILES BPMN AND SOA IMPLEMENTATION

No.	File Name	Information
1	BPTPM SOABPMProcess.bpmn	All the process of designing the business process modeling notation (BPMN) exist in this file, describing all of the modeling system built from the start to the finish.
2	composite.xml	In the software Oracle SOA-BPM, BPMN is one component in the SOA, so that this file model and connects all the components of SOA, such as BPMN with other SOA components (human tasks, web services, file adapter, business rules service engine).
3	RetribusiIzinGangguan_Rules.rules	One of the SOA components used in this project is a component thesis Business Rules Service Engine, is used to create service logic retribution payment terms Permission disturbance.
4	SaveHOBatal.wsdl	File Adapter SOA components used to store the final result nuisance Permission

		(HO) which cancel / reject.
5	SaveHOSukses.wsdl	File Adapter SOA components used to store the final result nuisance Permission (HO) successful / approve.
6	SaveILOk_Batal.wsdl	File Adapter SOA components used to store the results of the final Permission location of the canceled / rejected.
7	SaveILOK_Sukses.wsdl	File Adapter SOA components used to store the results of the final Permission successful location / approve.

The following table is an XML Schema Definition (xsd) file supporting the development and implementation of the Oracle JDeveloper SOA-BPM, as follow:

TABLE III. FILE SUPPORT XML SCHEMA DEFINITION

No.	File Name	Information
1	dataijin.xsd	Consists of : NamaIjin DataDasarIjin DetailIzinGangguan DetailIzinLokasi This xsd file is used to store basic data licensing applicant and details xsd others are used to store data details of this Permission / location of the applicant.
2	KTP.xsd	Consists of : Data get ID cards and ID The xsd file is used to accommodate variable data request ID and returns the data requested identity cards, ID cards when the data requested exists.
3	cekpembayaranretribusi.xsd	Consists of : Payment status Payment getStatus The xsd file is used to accommodate variable demand payment of applicant status data and restore data payment status of the applicant.

The following table is a testing process existing business processes in BPMN government licensing, testing conducted by any roles, and performed the testing process on each task and other BPMN components that exist on the respective roles, as follows:

TABLE IV. EXPLANATION TESTING BPMN

No	Business Process		Roles	Description Testing
	Filing Location Permission	Filing nuisance Permission (HO)		
1.1	Applicant Data Verification		Applicant	The applicant is required to fill in 3 personal data (NIK, ID card Valid Until, Mother's Name) correctly to be able to log into the system
1.2	Data Authentication ID card applicant		Applicant	Web Service ID card will receive 3 personal data of

				applicants and click authentication validation
1.3	check the ID card		Applicant	Web Service ID card will generate output that will be received by the gateway content ID, whether the three applicants' personal data is invalid / no, if not valid then process will be returned to the process 1.1, if valid, the process continues to process 1.4
1.4	Input Data General Licensing		Applicant	The applicant is required to enter basic data Permission, the same data for all kinds of permission, according to the input displayed form
1.5	Verify The Condition The Name Of The Permission Requested		Applicant	Gateway to check the condition whether the applicant has chosen the desired permissions location or disturbance (when you're choosing one of the options, then the process continues to a process 1.6), or not to choose both the process will be returned to the process 1.4
1.6	Input Details Location Permission	Input Detail of the nuisance permission	Applicant	Applicants are required to enter the detail data of location/ disturbance permission in accordance with the input form is displayed
2.1	Verification Status Location	Verify the status of the nuisance Permission	Service officers	Service officers perform a check of physical documents, document completeness terms of location/ disturbance permission according to the rules. If complete, service officers do approve, if not complete, service officers do reject on the process of application for permission
2.2	Check the Approve /	Check the Approve /	Service officers	Gateway will receive the output

	Reject Verification Status Location	Reject verification of a disturbance Permission Status		of the process 2.1, if approve, proceed to process 4.1 to a location permission (non-retribution) and continued to process 3.1 to permission disturbance (retribution). When reject proceed to process 5.5
3.1	Non-Retribution	Business Rules Retribution of disturbance Permission	Payment officers	Of the land area is entered in the 1.6, then the business rules engine will process the input area of land that is by comparing the rules table conditions and produce output appropriate retribution
3.2		Cost retribution of the nuisance permission	Payment officers	It is a component of the script that will accept insert appropriate retribution from the 3.1
3.3		Checks Payment Status	Payment officers	Officers will receive a payment slip proof of transfer of the applicant (as a condition of permission retribution), then enter the code data transfer and the transfer amount into the system in accordance with the input form of payment status appears.
3.4		Check the Approve / Reject Payment status	Payment officers	Officers perform payment approval to process the applicant's proof of transfer slip is valid or not, and will proceed to process 3.5, or did reject proceed to process 5.5
3.5		Checking Bank Transfer	Payment officers	Checking Bank Transfer is a Web Service that depicted connected to the interconnection between banks, is expected to process the inputs from 3.5 to validate the process slip proof of transfer applicants valid or not
3.6		check payments	Payment	This gateway will process the output

		already exist	officers	of the 3.5. If valid, then the process continues to process 4.1 (column disturbance permissions), if it is not valid then the process is returned to the 3.3 when it will be entered back bank transfer or process code in the reject 3.3
4.1	Approve Unit Checks Location - Location Permission	Approve Unit Checks Location - disturbance Permission	Unit Testing Locations	Checking unit checks the location of the physical location address of the location / disturbance permission filed, when in accordance with the applicable rules then did approve or reject the system if they do not agree
4.2	Check the Approve / Reject Unit Checks Location - Location Permission	Check the Approve / Reject Unit Checks Location - disturbance Permission	Unit Testing Locations	Gateway will receive the output of the 4.1 approve or reject, if approved then proceeding to process 5.1, if rejected then the process continues to process 5.5
5.1	Approve Sub-Licensing – Location Permission	Approve Sub-Licensing – Disturbance Permission	The unit Licensing Sub-Section	When Unit Licensing Sub-Division gave approve on Permission application must also fill other licensing data in accordance with the form shown
5.2	Check the Approve / Reject Licensing Sub – Location Permission	Check the Approve / Reject Licensing Sub - Disturbance Permission	The unit Licensing Sub-Section	Gateway will receive the output of the 5.1, if approve, proceeding to process 6.1, if rejected then the process continues to process 5.5
5.5	Save Location Permission Cancel	Save Disturbance Permission Cancel	The unit Licensing Sub-Section	This latter process shaped component service type of file adapter that will store data in the form of text files, to store data Permissions canceled (reject)
5.6	Save Data – Location Permission	Save Data - Disturbance Permission	The unit Licensing Sub-Section	This latter process shaped component service type of file adapter that will store data in the

				form of text files, to store data Permissions allowed (approve)
6.1	Approve Head BPTPM – Location Permission	Approve Head BPTPM - Disturbance Permission	Head BPTPM	Head BPTPM as giving the final decision to grant permission (approve) or not (reject) on Permissions filed
6.2	Check the Approve/ Reject Head BPTPM – Location Permission	Check the Approve/ Reject Head BPTPM - Disturbance Permission	Head BPTPM	Gateway will receive the output of the 6.1 as the last condition, if Permission (approved) by the Head of BPTPM then proceeding to process 5.6. If not (reject), then proceeding to process 5.5

#### IV. CONCLUSION

Research collaboration on the implementation of an integrated system of government licensing services, using service oriented architecture, coupled with business process modeling tools Managements with BPMN 2.0, and use those devices BPMS implementations of Oracle SOA-BPM 11gR1 can be implemented and tested according to expectations.

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#### REFERENCES

- [1] Federal CIO Council (2008), "A practical guide to federal service oriented architecture," The Federal CIO Council Architecture and Infrastructure Committee.
- [2] Ville Seppanen (2008), "Interconnections and differences between EA and SOA in government ICT development," in *Proc. the 31st Information Systems Research Seminar in Scandinavia*.
- [3] Zakaria I. Saleh (2013), "A framework for an E-government based on service oriented architecture for Jordan," *I.J. Information Engineering and Electronic Business*, vol. 3, pp. 1-10, 2013.
- [4] B. Heidi, D. Manas, K. Jayaram, Demed L'Her, P. Prasen, *Getting Started with Oracle SOA Suite 11gR1*, Packt Publishing, Birmingham UK, 2009
- [5] Gartner Research, "SOA Definition", SOA Principles Reports
- [6] Object Management Group's (OMG) SOA Interest Group, "SOA Definition", <http://www.omg.org>
- [7] Thomas Erl (2007), *SOA Principles of Service Design*, Prentice Hall, New Jersey.
- [8] Gartner Research (2010), "Magic Quadrant for Business Process Management Suites", Gartner BPMS Research



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