

## BPMN to BPEL: Implementing ATM System

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**Abstract-** BPMN provides a standard graphical notation for modelling business process. BPEL is a XML based language which generate executable code from BPMN diagram. Several BPEL engines are available which execute BPEL. In this paper , an example is provided to explain how BPMN diagram is generated and then with the help of BPEL executable code is generated.

**Keywords –** BPMN (Business Process Modelling and Notation) ,BPEL(Business Process Executable Language)

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### I. INTRODUCTION

BPMN: BPMN stands for Business Process modelling and Notation. It is a standard for that provides a graphical business process modelling notation for specifying business processes in a *Business Process Diagram* (BPD)[1]. A business process represents working of two or more organizations to fulfill the customer requirement.

BPMN has been developed by Business Process Management Initiative(BPMI). Now the BPMI has been merged with Object Management Group(OMG) in 2005. Currently we are having version BPMN 2.0[1].

### II. ELEMENTS IN BPMN

#### EVENTS

Events is used to represent that something's happen. Events are represented by circle. Start event, Intermediate event and End event are three types of event in BPMN. Start event act as a process initiator. Intermediate event represent which happen between start event and end event, End event represent the outcome of process.

#### ACTIVITIES

Activities are used to represent what task is to be done. It is represented with rounded rectangle. Activities are of four type: task, sub-process, transaction and call activity.

#### GATEWAYS

Gateways represent the merging and splitting of flow depending on the conditions expressed. Gateways are of

different type: exclusive, inclusive, parallel, parallel event based, complex and many more. Diamond shape is generally used to represent gateways.

#### CONNECTING OBJECTS

To connect flow objects connecting objects are used. They are of three types :message flow, sequence flow and association. An arrow is used to represent connecting objects.

*SWIMLANES*: Swimlane is consisting of pool and lane. Name of organization is represented by pool while lane represent the activities through which organization go throuh. These are represented by a rectangular box

#### ARTIFACTS

Artifacts represent the extra information to user. Data object, Group , and Annotation are three types of artifacts. Data object represent the data being used in our business process model. Annotation provide extra information so that model become more understandable. Group is used to group two or more activities.[1]

### III. EXAMPLE OF BPMN

Here is an example given to withdraw money from ATM. In this diagram firstly ATM machine authenticate the user, after authentication ATM from bank verify user'minium balance , then allow bank verify user'minium balance , then allow to withdraw money. First BPMN diagram has been to withdraw money drawn then it has been mapped into executable code by using BPEL.

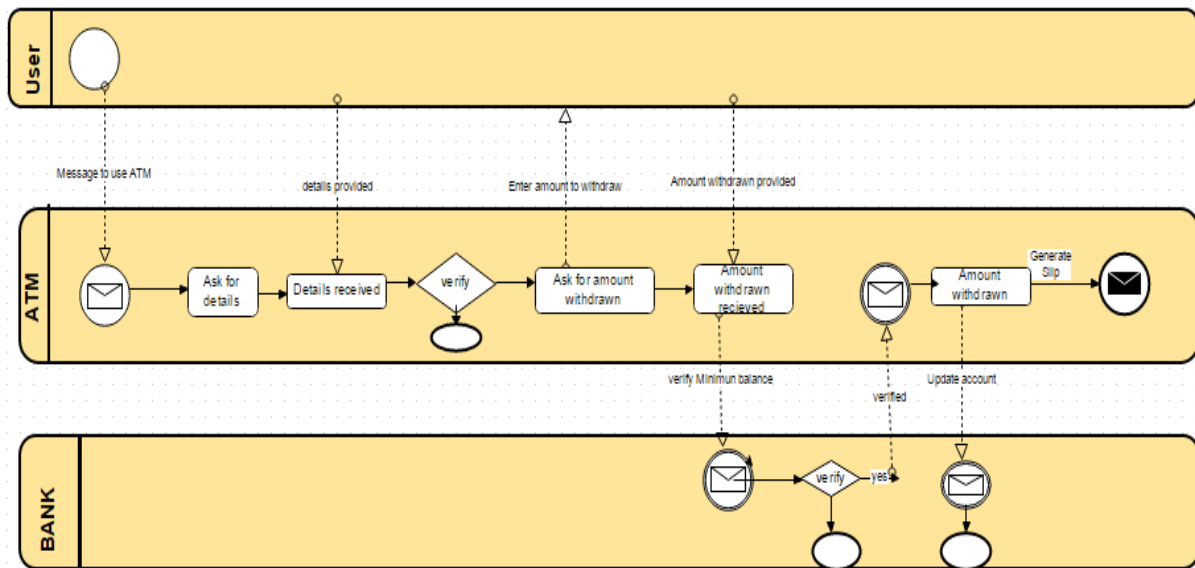


Figure 1: BPMN Diagram for ATM Use

#### IV. BPEL

BPEL stands for Business Process Executable Language. BPEL is XML-based execution language. It generates the executable code from BPMN diagram. It is based on WSDL 2.0, XML-schema definition.

#### V. ACTIVITIES IN BPEL

**VARIABLES:** Variables are used to store information about data used in process. There are two types of variables:

**SIMPLE TYPE:** This type stores the information about the variable such as their type string, integer, float.

**MESSAGE TYPE:** Message type holds a message which to be exchanged between organization.

#### PARTNERLINKS

Partner link gives the information about the organizations which are participating in business process.

**HANDLERS:** Handlers are used to handle the fault.

**RECEIVE:** Receive activity is used to show reception of message.

**REPLY:** Reply activity is used to reply to an organization.

**INVOKE:** Invoke activity is used to call a partnerlink when it is required.

**ASSIGN:** For updation of data, assign activity is used [2][3].

#### VI. WHY WE MAP BPMN TO BPEL

- BPMN act as blueprint for BPEL process.
- BPMN is utilized when outlining and enhancing the business process, but BPEL is used when we execute Business Process.

- BPMN is utilized by business analyst and BPEL is utilized by specialized expert and software engineer.

#### VII. IMPORTANCE OF BPEL

- It gives detail about the participants and explains their different roles.
- It represents which and what type of messages are organization are exchanging. Message exchange can take time one –two minutes to one-two months.
- It tells about which activities can execute in parallel. Which activity depend on which activity.
- It gives the information about data. We can identify which type of data to be exchanged between organization.
- It gives the information about exceptions that we can face in our business process.

#### VIII. BPEL CODE

In the above given example we will define the bpel elements as follow:

```
<Process name="ATM machine">
<partnerlinks>
<partnerlink role="Useatmmachine" name="client"
partnerlinktype="User"/>
<partnerlink myrole="authenticateuser"
name="ATMMachine" partnerlinktype="Machine"/>
<partnerlink myrole="Validateaccount" name="Bank"
partnerlinktype="Bank"/>
</partnerlinks>
```

```
<Variables>
<variable message type="Userinfo" name="input"/>
<variable message type="WithdrawAmount"
name="Withdraw"/>
</variables>
<message name="input">
<part name="ATMcardno" type="Xsd:String">
<part name="ATMPin" type="Xsd:Integer">
</message>
<message name="withdraw">
<part name="withdrawamount" type="Xsd:Integer">
</message>
<receive createinstance="yes" operation="authenticateuser"
name="ATMmachine" porttype="abc" variable="input"/>
<reply createinstance="yes" operation="authenticateuser"
name="ATMmachine" porttype="abc" variable="input"/>
<receive createinstance="yes"
operation="Withdrawamount" name="ATMmachine"
porttype="abc" variable="withdraw"/>
<assign name="Datamap1">
<copy>
<from part="ATMCardno" variable="input">
<to part="authenticateUser" variable="ValidateATM"/>
</copy>
```

```
<copy>
<from part="ATMPin" variable="input">
<to part="authenticateuser" variable="ValidateATM"/>
</copy>
</assign>[3]
```

## IX. CONCLUSION

This paper has explained BPMN , elements of BPMN,BPEL, activities in BPEL. It has been also explained why we need to map BPMN to BPEL.Also an example has been explained to map from BPMN to BPEL , but some loopholes are also present when we map from BPMN to BPEL.To find out these loopholes and to rectify them is the future work

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