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Relating Business Processes to the Elements of Underlying IT Application

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ABSTRACT

In this paper authors study how essential business transactions can be linked to their corresponding elements of an IT application using business process modeling approach. In this regard, the paper studies a real life business that is planning to develop a new IT application to support the policy issuance process. In particular, the paper studies the sequence of interactions between customers and an agent while applying for a new insurance policy.

INTRODUCTION

Despite the attempts to solve the misalignment of IT applications and business processes, the problem is still consuming considerable budget of enterprises. There is no need for quoting research papers in this regard, however it is worthwhile to mention that in the past decade up to 50% of capital expenditure of American companies went to IT (Carr, 2003). However, the more the expenditure on IT the higher the percentage of application's failure. These applications fail not because they don't work, but because they work differently.

In the simple example studied in this paper, we demonstrate how specification of business patterns can be mapped into essential elements of an IT application.

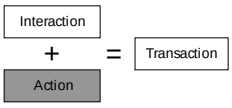
The development of IT application is the process of transforming business patterns into software element. Therefore it is crucial that business patterns are identified correctly in order to develop an accurate and adequate IT application. Also, it is important that there is some way to verify that all identified business patterns are represented as elements of the planned IT application. We will call these elements essential elements in the sense that their inclusion increases confidence in the correctness of the IT application.

In this paper we use the business transaction concept that is used for capturing essential business patterns that subsequently will be transformed into the elements of the corresponding IT application. For more comprehensive information on transaction concept using Petri nets notations readers are referred to another paper by the authors in these proceedings or to (Barjis and Barjis, 2004).

THE TRANSACTION CONCEPT

Each business transaction, encompasses *action* and *interaction*, as illustrated in figure 1. The *action* is the core of a business transaction.

Figure 1. Business transaction concept



The action represents an activity that changes the state of the world, where the *interaction* is facilitator of this activity.

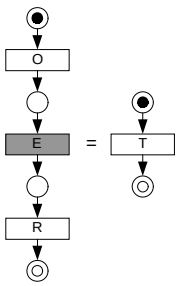
Example: A customer calls hotel's reception to reserve a room. After a few minutes, the receptionist gets back to the customer and states that a room of specified features is available. However, reservation is not possible without payment or credit card information. Before confirming the reservation, the receptionist asks the customer for his/her credit card information and verifies the card and availability of sufficient fund. Only then the receptionist gives the confirmation number to the customer.

As this example shows, there are three stages in each business transaction: the first *interaction*, the *action*, and the second *interaction*. Accordingly, as illustrated in figure 2, the transaction concept states that each business transaction consists of three phases that are called *order phase*, *execution phase*, and *result phase*. The order phase is the first interaction, the result phase is the second interaction and the execution phase is where the action takes place. These phases are abbreviated as O, E and R correspondingly. Petri nets concept is diagrammatically represented as rectangles and circles. Where rectangles represent a process and circles represent a result or state after the process.

On the figure 2, a transaction is represented as a sequence of the three phases (left side), while the right side of the figure compresses the three phases into one unit.

Each transaction involves two actors. The actor that initiates the transaction is called the *initiator* of the transaction, while the actor that executes the transaction is called the *executor* of the transaction. The following is description of the 'room reservation' process using the transaction concept:

Figure 2. Transaction structure using Petri net diagram



Transaction 1:	requesting a reservation
Initiator:	customer
Executor:	receptionist
Result:	a reservation is made

Transaction 2:	making payment
Initiator:	receptionist
Executor:	customer
Result:	payment is made

From the two transactions above, transaction T2 must be initiated and executed before transaction T1 is completed. Thus, initiation, execution, or completion of a business transaction may lead to initiation and execution of new transactions. In this way transactions are chained into arbitrarily large structures, called business processes (Dietz, 1999).

MAPPING BUSINESS TRANSACTIONS INTO IT APPLICATION

From the above example, one may intuitively realize how these transactions can be mapped into elements of an IT application that could completely automate the reservation process.

First of all, the IT application has to contain elements that accomplish these two transactions. The first transaction can be realized as an online reservation form. The interaction takes place between the user (customer) and the web application (representing the receptionist). When submitting the form, it should prompt the user to the second transaction, that is, to provide credit card information. The second transaction can also be realized as an electronic form. Only after verification of the credit card, the user (customer) can be presented with a confirmation number.

DEVELOPING AN IT APPLICATION FOR SSM

We have studied a company which is identified by a fictitious name "SSM Insurance Company". Although SSM has a complex distributed business process, due to the limited scope of this paper we have included only "applying for insurance policy" process that needs an IT application to be developed for.

Applying for Insurance Policy Process

If a customer wants to obtain auto insurance through SSM Insurance Company, than they should contact the agent from the company. These agents then offer plans and the prices that best fit the customer. The premium offered is based on the customer's driving record (number of tickets and accidents), age, martial status, residence, car type, and customer's claims. If the customer decides to purchase the insurance then they fill out an application for insurance with the agent. The agent then sends the application to one of the regional offices. The regional office checks the background of the applicant. If approved, the regional office notifies the agent and the agent tells the customer that they were approved and a contract is generated. The contracts are produced at the regional office and sent to the customer's agent, who adds the type of coverage the customer has. The Agent then explains what is covered under the plan and asks the client to sign the contract. By signing the contract, the customer pays an initial payment to start the coverage when approved. The customer is issued a temporary insurance card, and the official card is mailed to the customer at a later date.

Identification of Business Transactions (essential elements)

Following the transaction concept, the first business transaction can be identified as "obtaining a quote" or "requesting a quote."

T1 – Requesting for a quote
Initiator – customer
Executor – agent
Result – a quote is given

After completion of this transaction, the customer may decline or consider applying for an insurance policy. If the customer decides to apply for a policy, this will constitute the second transaction:

T2 – Applying for a policy
Initiator – customer
Executor – agent
Result – a policy is issued

In order for the agent to proceed, the agent must request approval of the regional office, which checks the customer's background:

T3 – Requesting regional approval
Initiator – agent
Executor – regional office
Result – approved/declined

If the approval is given, the agent asks the regional office to generate a contract based on the inputs of the customer:

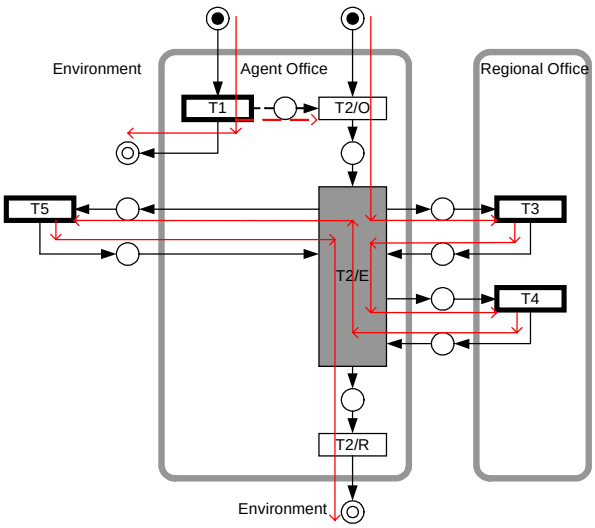
T4 – Generating a contract
Initiator – agent
Executor – regional office
Result – a contract is generated

Now the agent reviews and explains the prepared contract to the customer (agent and customer). If the customer agrees to the terms and conditions of the contract, the agent requests the customer to sign the contract and make the initial payment:

T5 – Paying for the policy
Initiator – agent
Executor – customer
Result – policy is paid

After identifying all transactions, a business process model is constructed using Petri net graphical elements. The model is based on the identified transactions by grouping and drawing the boundary of the two departments, the agent office and the regional office. then, transactions that are executed with the agent's office, regional office and environ-

Figure 3. Transactional model of "policy issuing process"



ment are grouped. Figure 3 shows all the transactions in a sequential order and their relation in regard to the departmental boundaries.

In the above figure, the actual sequence of actions is indicated by the red-colour straight arrowhead line along the transitions.

Figure 3 should be read in the following manner. The big gray rectangles represent boundaries of the processes (e.g., agent office, regional office). The two circles with black dots (tokens) represent the start point; correspondingly, the two circles with the holes represent the end point of the processes, where they terminate. Transaction T1 starts in the environment and the result is also communicated to the environment. This is a simple transaction and is, therefore, executed completely at once. Its result can serve as a conditional link for the initiation of Transaction T2. Therefore the dotted arrow is connecting the result of transaction T1 to Transaction T2; so a dotted arrow is drawn between T1 and T2. Now, Transaction T2 is a composite transaction that nests Transactions T3, T4, and T5. Therefore, this transaction (Transaction T2) can only be completed when Transactions T3, T4, and T5 are complete. As for Transactions T3 and T4, they are initiated in the Agent Office, executed in the regional office and the results are communicated back to the Agent Office. Transaction T5, payment for the policy, is initiated in the agent office, executed in the environment and the result is communicated back to the agent office.

LINKING TRANSACTIONAL MODEL TO THE ELEMENTS OF IT APPLICATION

For a successful IT application development, it is essential that all of the transactions of the model are mapped into elements that make up the planned IT application as follows: transaction T1 is searching for a quote based on the customer's parameters; after the result is returned to the customer online, the customer is give chance either to click "apply" or "quit"; if apply is clicked it will lead to transaction T2. Transaction T2 is an electronic form that requests the customer to fill in all fields of the form; this form has a "submission" button which is corresponding to the "Order" phase of Transaction T2 (T2/O). This submission must automatically have access to the regional office system that will place request for checking the customer background. Similarly transactions T4 and T5 can be mapped into IT elements that all together make up an integrated IT application.

CONCLUSION

The paper introduced a preliminary framework for identification and specification of essential elements of an IT application directly from the business process description. In order to conduct identification of these elements a concept and tool are needed to capture essential business patterns. For capturing these essential business patterns, the transaction concept is used that seems to be very appropriate for business interaction modeling.

Since IT application development is an expensive project, companies can not afford "trial and error" method. Thus, the model should be built in a fashion that one can check it and verify it with the business owners. The resulting model of figure 3 using Petri nets diagram is easily readable and can be simply simulated to find out any deadlocks or inconsistency problem.

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