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Auto Agent Commission calculation Using BST

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***Abstract*—** Today almost all insurance companies used online system where everything is automated from starting to policy dispatch. Various insurance policies have been offered online. There are various Business Process Management tools used today for reducing manual efforts and also minimized human errors. With such BPM tools organization able to complete tasks very accurately and economically. In any type of insurance medical and non medical documents play important role. With BPM tools such documents maintain in electronic format by using commercial scanners like captive and provide user interfaces to users of organization where user can view electronic documents along with available business data. In this paper a new functionality is proposed in existing system where insurance policy agents commission calculated using Binary Search Tree where a agent consider as parent node and sub agents as child node. Also this calculated commission will update in other systems which are integrated together with BPM tool. In proposed system we also update calculated commission on different user interfaces wherever its required.

Keywords*—BPM; Savvion; Documentum; Underwriter; UWR Data; BST*

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I. INTRODUCTION

In recent years we observed rapid growth in e-commerce and online insurance policies selling organizations. Different kinds of insurance policies have been offered online for online consumers. Mainly organizations uses BPM tools for following reasons: (1) Provide simple user interface to employees with access to electronic documents (2) Use of electronic documents helps to save papers and its helps nature indirectly (3) Transaction of electronic documents between users is very convenient and easy as compare to physical documents (4) Different group users able to interact very easily and provide status to next level user accurately and also save lots of time. In existing system a instance is created in Savvion BPM for each proposal document uploaded in Documentum. In proposed functionality in existing system when proposal document is retrieved from documentum, name of agent who submitted proposal can also updated in Savvion. As Life Asia is a Insurance Policy administration system where all information regarding proposal is save and same information is validated during process with available business data. In proposed system Agent and sub agent details are also kept in Life Asia for future reference. All business data value is stored in Life Asia against proposal unique id(contract number). Underwriter is most important user in Life Insurance Company. Underwriter takes actual decision of any proposal. In case require underwriter sends proposal to CMO for taking decision otherwise underwriter sends proposal to final stage. Fetching underwriter details from Life Asia is the important step. In proposed functionality we fetch Agent and sub agent details along with other details. Then underwriter decision is updated in Life Asia along with agent details. Once proposal and documents validated successfully then agent commission is calculated as per underwriter and CMO decision. Same commission is saved in Life Asia with premium and suspense amount.

Figure 1: Policy proposal document

For Agent and sub agent commision calculation binary search tree used. Binary search trees are used in computer science for rapid data storage and retrieval. With an ideally arranged BST with n nodes, most of the tree related operations require time that is not more than log(n). That means effort required to perform an operation on a BST grows logarithmically as size of the input grows.

II. RELATED WORK

In the classic presentation, nodes store only the difference between the left and right heights, which reduces storage and update costs. Balancing can also beperformed if each node stores its own height [1].

The height of the tree is the longest path from the root to a leaf node. The internal path length (IPL) of a tree is the sum of the depths of all nodes in the tree. Root of the tree has depth zero, and every son in the tree has a depth that is one more than its parent. This means that IPL of the tree would be minimal when every node in the tree has minimal depth. This is possible only when the tree is height balanced. For an average case analysis of a binary search tree, the internal path length is an important parameter [2].

Every node in the tree has to maintain additional information (apart from data and pointers) called "balance factor" that stores the effective balance of the tree rooted at that node. Tree is said to be balanced if the difference between the heights of two sub-trees of any node (balance factor) is between –1 and 1. Mathematically, –1 <= balance factor <=1. After each operation tree has to be examined to ensure that it is balanced. If the tree has become unbalanced appropriate rotation is performed in the appropriate direction [3].

As is standard in work on BST optimality, we consider only (successful) searches, not insertion and deletion. The letters n and m always refer to the size of a BST, and the total number of search operations performed on it, respectively. These are fixed global constants, and much of the notation depends on these values, either explicitly or implicitly. For simplicity, we denote the ordered values in the BST by the integers 1, 2… n [4].

Failure of a single voter can cause an election failure in this case. Simple voting schemes like Voter Verified Paper Audit Trial (VVPAT) and vote by mail are inherently insecure and provide no guarantee for the security or privacy [5].

Data Sources

Non-Medical Data :

All documents except medical documents are consider as a non medical documents in life insurance companies. PAN Card, Driving license, Election ID, Passport all these are consider as the non medical documents only. As an example we consider a tax credit certificate here.

Tax Credit certificate: If there is a change in your personal circumstances that affects the tax you pay, you need to tell Revenue. This could happen, for example, if you started work in a job where you can claim work-related expenses for a uniform. Revenue will then send you a new tax credit certificate that includes the changes. Revenue will give your employer the details needed to deduct the correct tax from your pay.

Tax Credit Certificate

FOR THE YEAR 1 JANUARY 2011 TO 31 DECEMBER 2011 AND FOLLOWING YEARS

Tax Credits	€
Personal Tax Credit PAYE Tax Credit	1650 1650
Gross Tax Credits	**3300**
Net Tax Credits	**3300**

Tax Rate Bands	€
Rate Band 1	**32800**
The amount of your income taxable at **20%**	**32800**

All income over **€32800** is taxable at **41%**

Allocation of your Tax Credits and rate Bands (Subject to Rounding)

Employer	Tax Credits €			Tax Rate Bands €			
	Yearly	Monthly	Weekly	Rate Band	Yearly	Monthly	Weekly
Newsagent Limited	3300	275	63.47	20%	32800	2733.34	630.77

Figure 2: Tax Credit Certificate

Medical Data :

Figure 3: Medical Documents

Medical data source are most important part in life insurance domain. As before applying for policy, individual needs to present medical health report along with all test details. Patient name, test date, addresses must include in report. Mainly bloods, ECG, kidney, bladder tests are common.

III. PROPOSED SYSTEM

In existing system mainly few systems are integrated together to achieve maximum benefit of automation.Main components are savvion, documentum, life Asia and captive. Generally captive is a scanner tool mainly used for bulk scanning purpose. All scanned documents are store on FTP server from where electronic documents will be accessible to documentum. In existing system agents and sub agents collects proposal forms from actual customers and sends documents and proposal forms to regional office for scanning purpose. Depends on policy amount commission is granted to agents. Currently commission is calculated manually by a team of finance department. In proposed system same agent commission is calculated automatically using Binary Search Tree where agent is consider as parent and sub agent consider as child node. Also in proposed system agent commission field is updated in documentum and Life Asia. Also agent name and is added to reporting tools. The proposed system should help the user to work user friendly and he can easily do his job without time lagging. The proposed system should help the user to work user friendly and he can easily do his job without time lagging.

After adding new functionality to existing system the normal connectivity via IBM MQ will not hammer as a new field needs to insert in MQ also. In proposed system agent commission must be calculated once CMO and Underwriter approved proposals and all medical and non medical documents. If Underwriter or CMO reject proposal or other documents then there is no meaning of commission calculation for new policy.

New User interfaces in proposed system:

Login window – These are login jsp pages used for login purpose at different level with different access levels. Admin login having admin rights.

CreateAgent window – This is a jsp page used for creation of new agent. When any new agent joins company then new Agent is created in system.
Approve Agent window – Management needs to approve newly join agent. For it, this GUI is used where actual approval of agent
Agent Window- After approval done then agent provided with login details. On this GUI agents needs to fill his details and submit same.
Fetch Agent Window – This GUI is used for fetching Agent details
Node Complete Window – This GUI used to indicate exact status of nodes.
Pay Agent window – This GUI is particularly used for payment status of Agent.
Update Agent Window – Agent information is updated here on this GUI.
View Agent Window – Agent information is displayed here.

Main Proposed System Components are:

Captiva: Captiva is a scanning tool used in corporate for scanning purpose. Now day's insurance companies are using this tool for huge document scanning purpose. In insurance domain scan documents play important roles, so high quality scan documents are must. All scan documents save into documentum cabinets

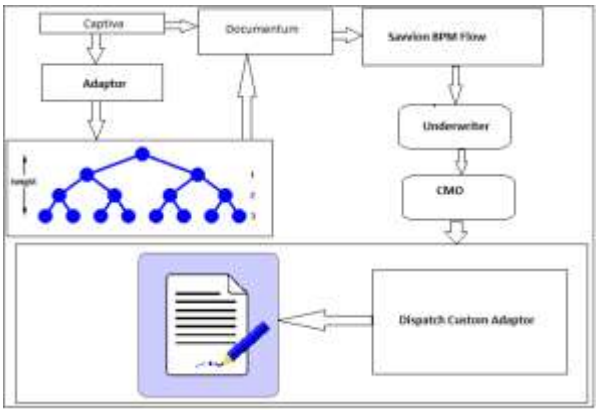

Figure 4: Proposed System Architecture

Adapter: There are agents in different states in India. Agents provide application forms to customers fill same and then send physical document copies for scanning purpose. For each policy agents awarded with cash benefits. There are sub agents under agents. Using BST concept this commission is calculated and related information send to documentum.
Documentum: Documentum is a content management tool specially use for document storage. All scan documents are store in related cabinets and related information is saving in database.
SavvionBPM: Savvion is a BPM tool use mainly for designing business processes. Savvion contains mainly custom adapter, manual adapter. Custom adapter is a java class which integrated with manual adapters. Manual adapters are user interfaces with GUI.
Underwriter: Underwriter is a manual adapter where users check polity related details from documentum using different adapter. Mainly IBM MQ reads saved values in documentum and create instance for policy. Application Id and object id are main values fetch from documentum. Underwriter check all other related values in mainframe system (Life Asia) before sending this information to Chief Medical Officer (CMO).
CMO: Chief Medical Officer is a person who finally checked all medical documents before sending policy for dispatch. Once CMO will be fine with all documents then all details forwarded to Dispatch Adaptor.
Dispatch Custom Adapter: Dispatch Adaptor is a custom adapter where all approved policies from CMO are provided to dispatch team for further process. A pdf is populated for all these policies and send to team. Dispatch team dispatches these policies to related persons via courier.

IV RESULT ANALYSIS

To evaluate our proposed system we perform some extensive experiments of different number of documentum. We select 'Time taken for calculation' as a performance measure.

Sr. No	#Documentum	#NodeToCalc	Time(ms)
1	2000	2000	2100
2	2500	2500	2650
3	3000	3000	3200
4	4000	4000	4300
5	5000	5000	5600

Table 1. Linear Search for Calculations

Here number of documetum is actual scan documents by agents which are used for further policy issuance. Each documentum is a node in BST. Calculation of commission should be performed at each node.

Sr. No	#Documentum	#NodeToCalc	Time(ms)
1	2000	2000	1400
2	2500	2500	1650
3	3000	3000	1800
4	4000	4000	2400
5	5000	5000	3100

Table 2. Binary Search for Calculations

We input an increasing number of documentum node to calculate time taken for commission calculation. Table 1 and table 2 shows experimental data and time consumed for commission calculations for linear search and binary search respectively.

As shown in figure 5, the number of documentum and time taken for commission calculation are directly proportional to each other. The graph follows diagonal line while as shown in figure 6 the number of documentum and commission calculation follows diagonal line but the proportion of increase in time taken are slightly below the linear search. We then conclude that the time proportion in both the system follows the diagonal line but in BST the performance increases as line intersecting the all points stays below the diagonal.

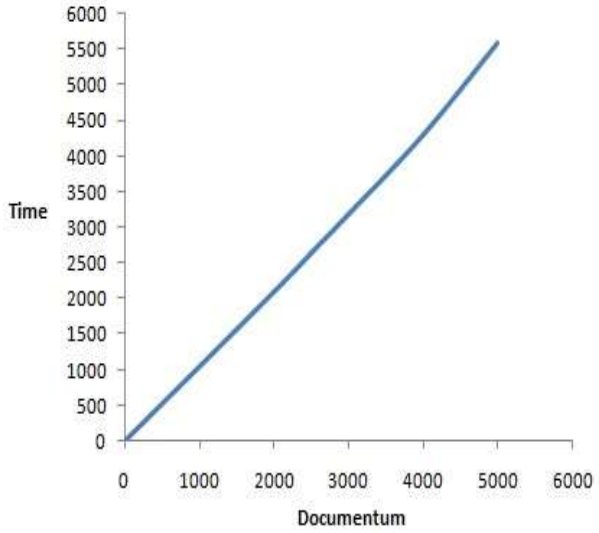

Figure 5. Linear Search

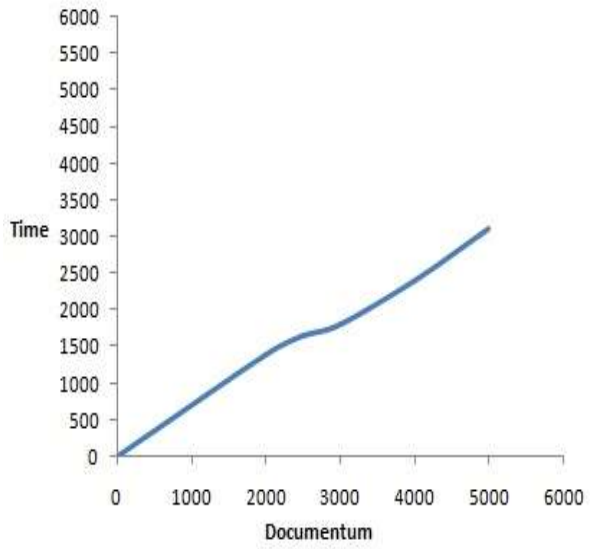

Figure 6. Binary Search

The time graphs are plotted on limited number of documentum. For both the systems we tested our approach on same no of documentum. The BST graph shows the better performance with respect to time taken for commission calculations.

V CONCLUSION

A BPM (Business Process Management) is integrated with content management tool i.e. Documentum and Mainframe system Life Asia. UNIX cluster environment is used for routing requests from main proxy node to child nodes. Here we calculate commission of insurance agents who works for company and works with actual policy holders. For calculation of commission Binary Search Tree is used. We consider agent as a Parent node and sub agents as child node and calculate commission on chaining marketing basis.

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