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Development of Loan Module using Business Rules Engine

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Abstract: Banking loan module is a runtime business application. It is the automatic processing of all the loans, due to which the loan form can be filled from anywhere and the bank person approves loan within short span of time. There is very big crowd to fill the loan form manually which is very tiresome job. Also the manual process is very lengthy process which requires 3 days for approval of loan. Our customers will having their loan applications approved within 60 minutes of lodging the application instead of 3 days as per the paper-centric solution we were persisting with. This paper consists of method of development of dynamic loan module system which includes the loan origination process, loan form filling process and loan verification process. The method is developed by using the RETE pattern matching algorithm. Due to which the loan module system becomes very fast and work effective. In addition to this loan module system, we have also developed the CIBIL score generating system for the approved loan applications and determination of rupee dollar rate and calculation of rate of interest of loans. Due to which the manager originates the roi of loans that also helps the manager to stabilize the India's economy and prevents itself from recession and other economic falls.

Keywords: Business rules, cibil score, loan terms, market semantics, information systems, business processes

I. INTRODUCTION

Internet bank is a complete, easy-to-deploy and maintains solution offering flexible prices based upon the organization needs and scope of activities. The internet bank has low hardware requirements both on bank and end user sides. Banking application includes the cibil score generating system Internet banking system has become popular in recent years. Internet banking system is very easy for customer to access his account, check his balance and transfer his money within minutes. Currently the account holders of a bank want to easy and quick access and securable way to withdraw his money or other banking products. Online banking is one of the best way to access banking products, you can check your balance, pay your bills at your home just through enter with your email id on your respective bank web portal. Internet banking services means the services are provided by a bank to their customers through internet. Some examples of internet banking services are as below; Electronic Fund Transfers (EFT),Debit Card , Utility Bills Payment ,Credit Card , Prepaid Smart, Bank Account/Balance Statement. Business rule engine is a software system that executes one or more business rules in a runtime production environment. A business rules engine enables an organization to increase its agility and speed to adapt to business process execution. Facing the complexity of business processes and rules user find it difficult to understand the underlying logic of the business. They are not able to analyze and make appropriate decisions in a timely fashion when business process issues arise. In recent years business rules engines (BRE) have become a key component in almost every major enterprise class projects.

II. CONCEPT OVERVIEW

It has been widely recognized that many future database applications including communications, manufacturing and engineering processes will require some kind of rule based reasoning. Rule based systems often spend a large fraction of their execution time matching rule patterns with data. A business rules engine enables an organization to increase its agility and speed to adapt to business process execution. Today's dynamic business environment presents many new business process management challenges. The number of business rules in a typical information system can range from several hundred to several thousands and the number of computer and process controls for reasons of data compliance, quality control and internal audit can similarly reach into the thousands. Facing the complexity of business processes and rules user find it difficult to understand the

underlying logic of the business. They are not able to analyze and make appropriate decisions in a timely fashion when business process issues arise. In recent years business rules engines (BRE) have become a key component in almost every major enterprise class projects. The increased importance of projects using BRE has been recognized throughout the industry. Business rules engines have not only have become a more powerful, scalable and robust technology, which is capable to process an extremely high number of complex rules per minute, per hour, and even per second; but whole BRE platform is evolved. The BRE platform is a complex environment with the special tools for development, analysis and design as well as numerous enhancements, making the process of performing encountering of business rules very efficient. Business Rules Engine (BRE) provides an automated rule application of processes on which inference such as backward and forward chaining is enabled. As the recent study on modernizing information systems, less than 30% of software source code contains business logic, while the remaining code supports infrastructure-related activities. It follows that, if the large part of software changes are due to the need to adopt its functionality to the changed business requirements, then facilitating comprehension of software with automated business knowledge extraction methods may significantly reduce the cost of software maintenance and evolution. This hypothesis has been investigated by many researches during the past several decades resulting in numerous methods for development of business rule engine for rule based systems. When working with a BRE the main entity is a rule. A rule is a set of conditions and associated actions which performed when the conditions met satisfaction. A rule is written in the form of an "If" and "else" statements, which might have preconditions that are other rules which must have to be executed or matched for the further processing of application should be in the same ruleset. HDFC banks develop the online loan module for personal and car loan using SOA technique. Also various methods such as YES/MVS real time expert systems, YES/OPS system Set-Oriented Constructs, LEAPS, BPRE Rule Matching Algorithm are used for development of business rules engine. In addition to the online loan module system, we includes loan origination, calculation of rupee dollar rate, cibil score generating system, interest rate increment system, currency calculator and loan and emi calculator.

III. PROPOSED METHOD

The method proposed includes basically six phase's loan origination, pre evaluation/loan form filling, Application form verifying, personal verification and mailing to customer.

A. Loan Origination

Loan origination phase includes calculation of rupee dollar rate on the basis of factors Strength of the economy such bas import and export, Public Debt, Market Sentiments (Demand and Supply) and Growth of the Economy.

These factors dynamically changes according to the market, which changes the rupee dollar rate and due to which the rate of interest on loans increases or decreases. This phase helps the bank manager to decide the interest rate of home loan, personal loan, education loan and car loan. Also this phase decides the factor of rupee dollar rate, so that NRI people can check the particular dollar amount in rupee form.

B. Pre Evaluation/Loan Form Filling

This phase includes pre evaluation of the applied person by using loan and emi calculator which has the parameters such as tenure, loan amount, interest rate, monthly salary and existing emi. This calculator decides the pre evaluation of the applied person that how much the emi for the particular loan amount, what the eligible loan amount is and whether the applied person is eligible for that much amount of loan. This phase also includes the customer loan form which contains various parameters such as Applicant details, Loan details, and occupation details and Upload the required documents. In this phase, the person fills the particular form of loan. The customer can apply for home loan, personal loan, education loan and car loan according to his requirements.

C. CIBIL Score Checking

In this phase, the manager checks the cibil score of particular applied person by entering the pan id of the applied person or checks any history of that person in the database. This gives the information about the person's cibil score, personal information, contact information, employment information, account information, loan enquiry information, persons existing loans if any. This cibil report also gives the information about check bounce, ecs bounce, ecs bounce on date payment, fourth closed loan, ecs bounce late payment. This helps the manager to check out the persons cibil score which tells the institution how likely the applicant pay back a loan based on past credit usage and loan repayment behaviour. High credit score leads to the eligibility for particular loan and Low credit score leads to rejection for particular loan.

D. Application form verifying

In this phase, the manager verifies the loan application by using the business rules engine developed by using basic facts of rete pattern matching algorithm. Rules of loan checking process is very complex and facilitating comprehension of software with automated business knowledge extraction methods may significantly reduce the cost of software maintenance and evolution. The business rules engine checks the different facts such as Age: Between 21 & 65, Documents attached: Id proof, Salary slip and Property cost slip, Emi must fit in payable emi, Cibil score(if done with previous loan)>=700 and entered loan amount should be less than the eligible amount. The rule engine gives suggestion about Candidate Age Is Not

Eligible For Loan, Don't have Employment in stable company, As per Salary Statement Candidate Is Not Eligible For Loan, Bad Cibil Score, Emi Can Not be Payable, The Applied Customer is Defaulter For a Loan. In this phase, the manager checks out with those facts for the possible approval of loan of applied customer.

E. *Personal verification*

In this phase, the manager checks with the persons following personal verification facts: Address Verification, Living Years (More than 10 years), Age Verification, Business/Company Verification, Medical Verification and Living Style. For the possible move towards the approval of loan these all facts have to be checked of the person. Thus manager checks out with these verifications and decides that whether to give loan to the applied person or not.

F. *Mailing to customer*

In this phase, if the applied customer fulfils all the rules and regulations of the particular loan then the system will automatically sends the mail to the customers mail address that your loan is approved after clicking the approve button . If any customer not fulfils the rules and regulations of loan, then the system sends the mail to applied customers mail address that your loan is not approved after clicking loan cancel button. The system also suggests the rejected customer to check systems loan and emi calculator for the possible combination of loan amount and tenure so that the system willing towards the approval of loan.

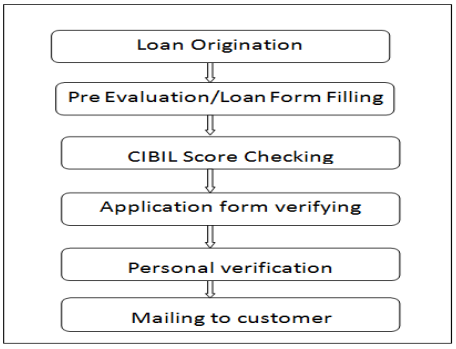

Fig1. Flowchart showing the proposed system

IV. PROPOSED APPROACH

In our approach, the manager originates the rate of interest of loan by using the rupee calculator and sets the particular rate to the home loan, personal loan, education loan and car loan. The rate of interest depends upon the values of rupee dollar rate. The rate of rupee vs. dollar is calculated by the formulae

Rate = Addition of Values of parameters / (Number of factors*1000)

And ROI to change= (Current rate – Previous rate)/ Number of factors

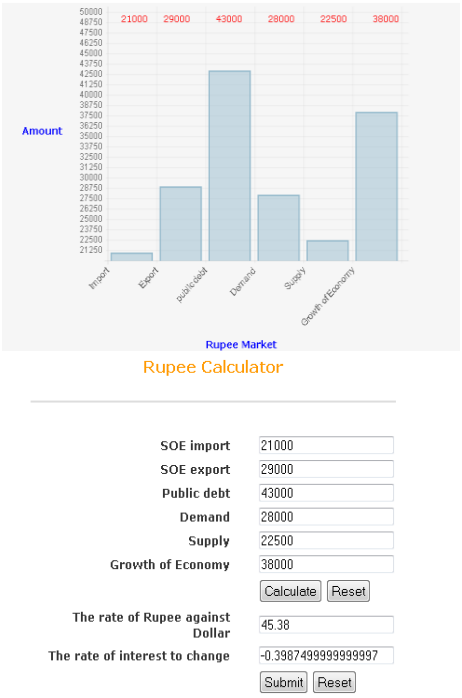

Fig2. Rupee market and rupee calculator

Then customer evaluates the eligibility of loan by using loan and emi calculator or directly fills the form of particular loan by filling the all details of form. This calculator decides the pre evaluation of the applied person that how much the emi for the particular loan amount, what the eligible loan amount is and whether the applied person is eligible for that much amount of loan. In case of NRI person, it checks with the dollar amount conversion to rupee amount by using currency calculator

Fig3. Loan and emi calculator

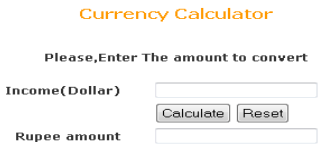

Fig4. Currency calculator

The person use the menu tab to be clicked for applying the particular loan and filling the details of particular loan shown as following:

Fig4. Home loan application form

Fig5. Personal loan application form

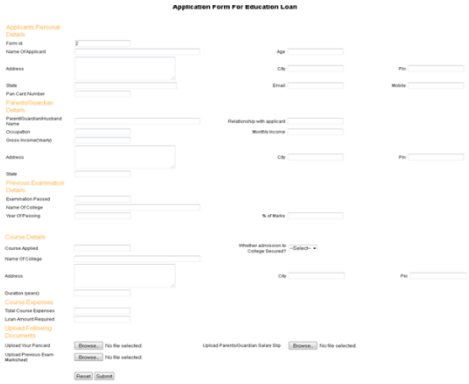

Fig6. Education loan application form

Fig7. Car loan application form

Fig8. Loan enquiry form

The manager checks the cibil score of particular person in the database of banks cibil, to check his cibil score and other loan details. The manager checks with the information about the person's cibil score, personal information, contact information, employment information, account information, loan enquiry information, persons existing loans if any. This cibil report also gives the information about check bounce, ecs bounce, ecs bounce on date payment, fourth closed loan and ecs bounce late payment.

Fig9. CIBIL credit report

After this the manager click the verify button of verify menu to check all the rules for approval of loan by using business rules engine. The business rule engine includes the following set of rules:

```
if (cibilscore < 700) {
result = "cibilscore";
}if (age1 <= 21 || age1 >= 65) {
result = "age";
}else if (pan == null) {
result = "idproof";
}if (salslip == null) {
result = "salaryslip";
}else if (employer == null) {
result = "employer";
} else if (eloanamount < loanamount) {
result = "loaneligibilty";
} else if (totalemi > emicapacity) {
result = "emicap";}
else {result = "satisfied";}
}Return result;
```

Fig10. Rule set for approval of loan

The rule engine gives suggestion about Candidate Age Is Not Eligible For Loan, Don't have Employment in stable company, As per Salary Statement Candidate Is Not Eligible For Loan, Bad Cibil Score, Emi Can Not be Payable, The Applied Customer is Defaulter For a Loan. After this phase, the manager checks with the persons following facts: Address Verification, Living Years (More than 10 years), Age Verification, Business/Company Verification, Medical Verification and Living Style.

Fig11. Physical verification

After this, the system sends the mail to the customers mail address that your loan is approved if he fulfils all the required facts to be fulfilled for approval of loan otherwise sends the mail your loan is rejected ,check the websites loan and emi calculator.

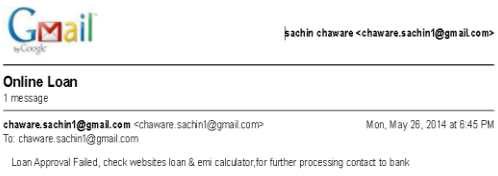

Fig12. Mail to customer

V. CONCLUSIONS

At the outset of this project, we had two major concerns: Would the database-oriented BRE perform efficiently in a production environment and would business administrators find the approach both easier to use and more transparent. First, the database-oriented BRE has been found to run efficiently in a production environment and to scale very efficiently. Second, the BRE design has been found to be easy to use and understand.

The BRE helps the application users in both understanding the business rule logic and executing the intended tasks. This design can be easily implemented in a database workflow application. Future issues to be studied include developing a rule validation process to prevent rule conflicts and investigating rule management issues at the enterprise level.

We have successfully developed the business rule engine for the bpm of loan module with following features:
The internet bank has low hardware requirements both on bank and end user sides. User friendly interface can be easily redesigned according to the bank needs. Internet bank is a complete, easy-to-deploy and maintains solution offering flexible prices based upon the organization needs and scope of activities. New functionality and developments can be easily reflected in the system.

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