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Implementation of a Digital Payment Processing System Using Spring Boot Interceptor Patterns via Swift Messages

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Abstract: ***A financial transaction is an agreement, or conversation, entered between a purchaser and a dealer for the trade of an asset for virtual processing of payments. E-cash (digital money) is the crucial fee way in digital exchange, this is seen as the same as coin in the real world. A financial transaction is one wherein there is some kind of pastime that modifies the rate of the property, liabilities, or owner's fairness of a business enterprise. The ones styles of transactions are - component transactions which includes a buyer and a seller, and that they usually include cash in some way. The aim of this work was to develop a systematic ordering, comprehensive and classification of issues in the area of financial services. Spring Boot is used for the implementation of the product and it is developed with the help of swift messaging standard for easier transitions and efficient transactions. A customer will subscribe for the service which is provided by the customer service provider. The customer will have to pay the monthly fees for that service. It will be automatically debited from the bank account. The work of this project is for the customer to review the billing amount and also request for billing date extension and request for bill cancellation if needed. The complete process is divided into two parts which are inbound and outbound. There will be a queueing process which picks the customer the query and processes it one by one. The customer will initiate a query and after all the verification and validation the response will be sent to the customer.***

Keywords: Inbound, Outbound, Query, Bill Pay, ZAPP, creditor, Debor.

I. INTRODUCTION

The global financial services market is about to grow from $ 20490.46 billion by 2022 to $ 22515.17 billion by 2024 with a total combined annual revenue. This growth was mainly due to businesses reorganizing their operations and improving the impact of COVID-19, which had led to restrictions affecting social isolation, remoteness, and closure of industrial activities that led to difficult working conditions. In a business, there are primarily four different sorts of financial transactions. Sales, purchases, receipts, and payments are the four different categories of financial transactions. Sales are the settlements that take place when property is transferred from a buyer to a seller in exchange for cash or credit. Sales transactions are documented in the seller's accounting journal as a credit to the sales account and a debit to cash or accounts receivable. Purchases are the transactions that a business must carry out in order to acquire the items or services necessary to achieve its objectives. Cash purchases result in a credit to cash and a debit to the inventory account. A written acknowledgement that one has received or taken into one's possession a specific quantity of goods or money is referred to as a receipt. Payments are the transactions in which a company exchanges money for a service or product. As a credit to cash and a debit to accounts payable, respectively, they are noted in the accounting journal of the company issuing the payment. BSPs, also known as Merchant Service Providers, are independent firms that assist business owners in accepting a variety of online payment options, including cash cards, credit and debit cards, e-wallets, and online banking. Let's walk through a basic online transaction to illustrate how a BSP operates, starting with the moment the transaction is initiated and ending with the moment you see the money in your account:

1) A transaction request is issued to the payment gateway you've registered with after a customer inputs his card information and clicks "pay."
2) The BSP then confirms the customer's card information and determines whether there are sufficient funds in the customer's card account to cover the payment. A payment processor assists the PSP in carrying out this task.
3) The BSP starts a transfer of money from the customer's bank to the merchant account you have linked to your business once the customer's card information has been verified and it has been determined that there are enough funds in their account.
4) The BSP then notifies you and the customer of the successful payment in a transaction notification.

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II. LITERATURE SURVEY

Electronic commerce and the simplicity of present transactions have resulted in a massive increase in credit card acceptance among users from all sectors of life. However, despite their tremendous benefits, users are still hesitant in using them, particularly for online transactions, due to the rising rate of credit card theft. Several security models for secure online payments have been suggested and implemented, however the exchange of confidential credit card data via the Internet has made electronic payments susceptible to cyber attacks. We explore and assess recent advancements in online authentication procedures, such as fingerprinting, one-time-password systems, and cardholder authentication using mobile devices and the Public Switched Telephone Network, in this study. This infrastructure is more comprehensive, robust, and user-friendly, and it does not necessitate the installation of specialised hardware at the customer's location. Researchers offer a framework for an electronic currency system in this paper, which provides a combination of anonymous transactions with digital payment procedures. The paper begins with a discussion of a hypothetical UML-based model for an electronic cash system. The implementation issue is then addressed in Java using standard cryptographic packages. Atomicity is required for dependable and trustworthy electronic commerce processes, as well as to safeguard the welfare of users. Determined by the standard e-cash method, an instantaneous and economical e-cash (electronic cash) transaction protocol is proposed. The protocol integrates the delivery of digital items into the payment process. With the exception of ensuring integrity at all three levels, the innovative protocol boasts exceptional efficiency and technical feasibility, owing to the removal of unfavorable strict assumptions. In addition, the recommended protocol includes non-repudiation proofs in anticipation of future disagreements. Finally, a study of atomicity and performance will be shown. The study examines, recommends, and illustrates ways for enhancing the security and safety of financial transactions via electronic payment cards by programming the card transaction limit utilizing mobile technological devices. The usage of digital electronic payment cards for numerous payments and transfers of needed income from bank accounts provides users with convenience it offers. However, there are issues with the security and safety of financial transactions while employing electronic cards. The use of mobile technologies to enhance the security and protection of bank electronic card transactions is advocated and illustrated. As a result of the procedure, transaction limits for the electronic card have been programmed using smart phones and mobile platforms. The mobile application's architecture, functionality, advantages to both the bank and the user, and how to utilize it are all outlined. Transaction-based e-cash has replaced the traditional cheque transaction due to the rapid growth of technology, networking, and computing infrastructure. The fundamental issue in recent years has been the effectiveness and security of the e-cash system. Based on the system technologies of authentication mechanisms and blind signatures, this study presents an effective and equitable anonymous off-line electronic payment system. Furthermore, based on the system's and related systems' safety analyses, it contains numerous security mechanisms such as anti-counterfeiting, anti-tracking, and anti-repayments.

III. METHODOLOGY

The complete implementation of the project is divided into two parts:

A. Inbound Flow

Yaml file should be prepared before the development. Yaml file is given as the input from that yaml file to generate pojo classes. The request to Inbound CSI will be called to the signature verification happens and once the signature is passed then it will be moved to schema validation. All the validation will be carried out. Once the validation is done then the core update for the system Api is called and from there database verification and insertion is done. The data is stored in oracle DB and the DB updates are done and then the rnque process happens. All these processes are carried out by Csi flow config based on the index number. This will complete the inbound flow.

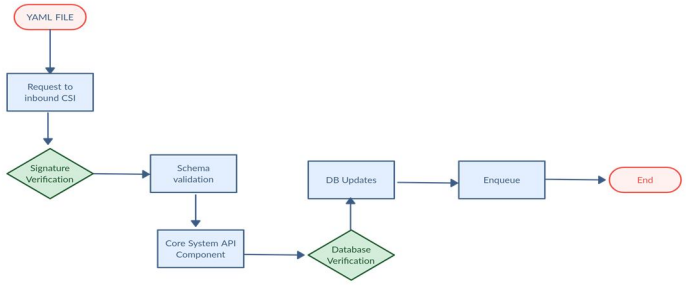


Fig 1 Inbound Process

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B. Outbound Flow

Outbound is the second phase after the inbound process is done. In csi we have a listener that listener will pick up and it will retrieve from the queue table and it will send the Data to the Get system API call and from get system all the data will be retrieved from the database. Then it will be sent to the stubs. In the stubs we have schema validation and as well as signature verification. Then the stubs will send the response to the event api. The event api will be the last Api called so it will update the db and at the end there will be a response sent to the end user.

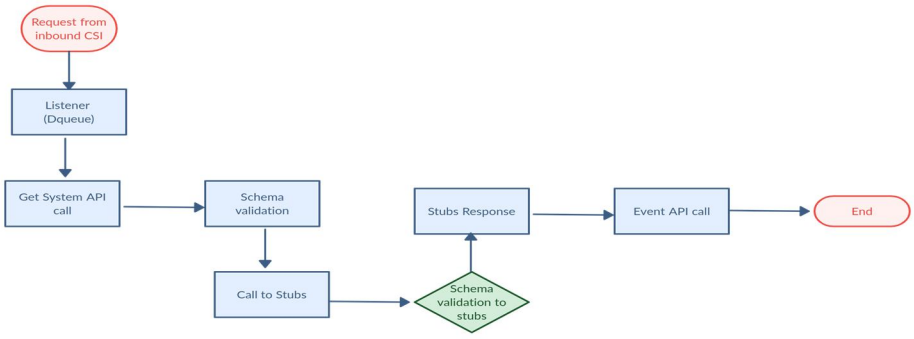


Fig 2 Outbound Process

IV. SYSTEM ARCHITECTURE

The consumer will send a query to the Consumer Financial Institution(CFI) regarding the Biller Financial Institution(BFI).The CFI is responsible for managing the consumer mobile banking application, consumer accounts and Payments Interface. The CFI will directly connect with the BFI,which is responsible for maintaining the corporate accounts and Payments Interface. Payments Interfaces are connected through a Gateway. The Biller Service Provider(BSP) maintains the Invoice docs and Bill Payments. API Gateway bridges the Zapp Platform and entire System Architecture. The Zapp Platform receives the data in the form of REST XML or REST JSON which is usually termed as Yet Another Markup Language (YAML) files. YAML files will be used to create the pojo classes and based on that pojo classes. Consumer Service Interface or Customer Service Interface which acts as a router between the Frontend and Backend. High Security measures are maintained. A complete security module is present for the Consumer Service Interface(CSI). CSI calls the DB operations. The core database used is the Oracle DB which helps in the database operations, where Insertion, Deletion, Updation operations are performed. Master Data Management acts as the central repository which holds the entire company details. Edit permissions are not given for users to edit the Master data management. Batch Process accepts multiple requests from the users at the same time, but processes each request according to First Come First Serve(FCFS) criteria.

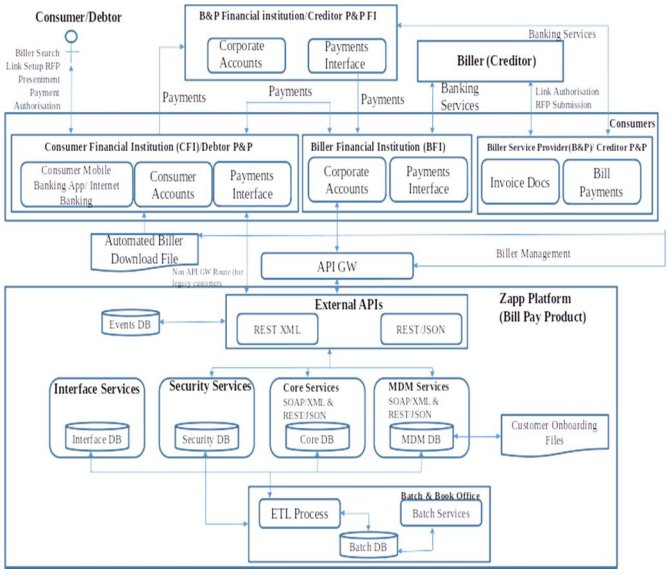


Figure 3 : System Architecture

V. RESULTS AND ANALYSIS

The project was focused on implementing the query initiation and response api. The process will start from the customer service interface and then be passed to the security layer. Then the response will be sent to core database where the DB operations will take place and sends the response back to user.

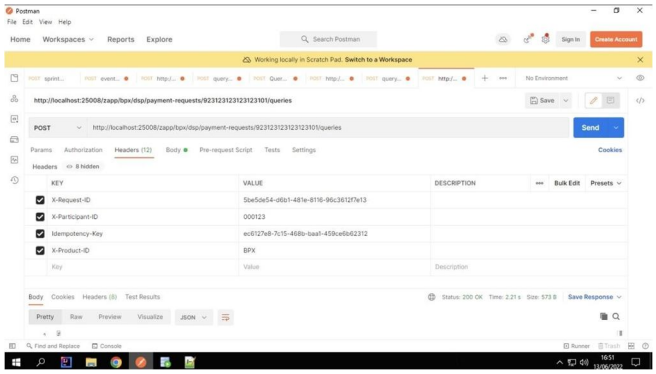


Figure 4 : Header for POST method query initiation

Figure 4 depicts the Header present in the postman. It has 5 headers which are passed in key value pairs then which are passed as a POST method and then the response will be recorded.

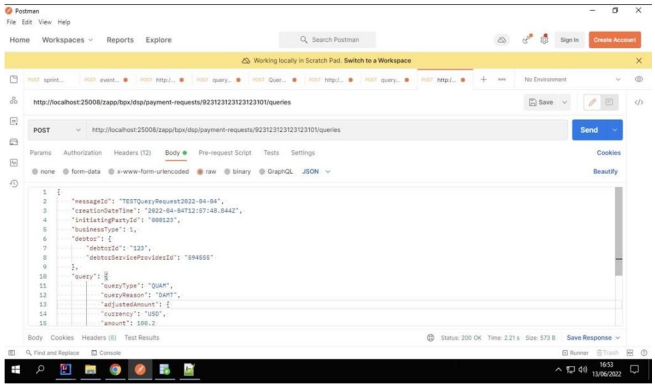


Figure 5: Body for POST method query initiation

Figure 5 depicts the Body present in the postman. It has values which are passed as key value pairs then which are passed as a POST method and then the response will be recorded.

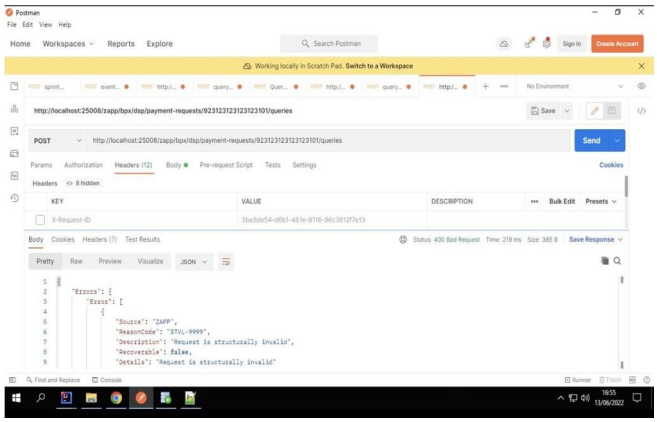


Figure 6: STVL error for query initiation

Figure 6 depicts the STVL error caused if any one of the deader are missing. It validates the header passes which are correct or not. If the headers not valid then it will throw the structural invalid error.

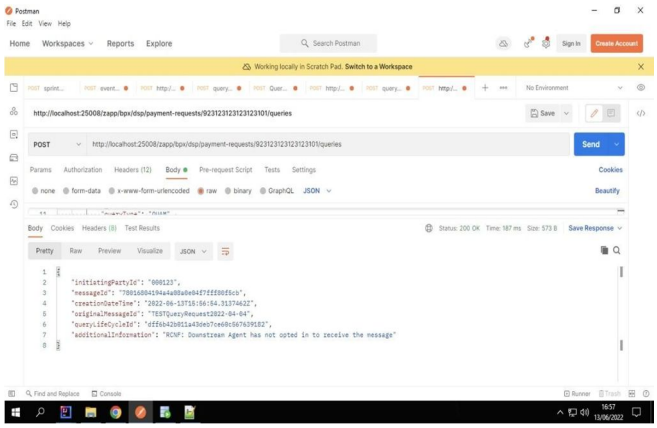


Figure 7: Happy path for query initiation

Figure 7 depicts the Happy path for the end to end query response. The response is with 200 which means the data is stored in the database and a response is sent from database to the end user then query initiation is successful.

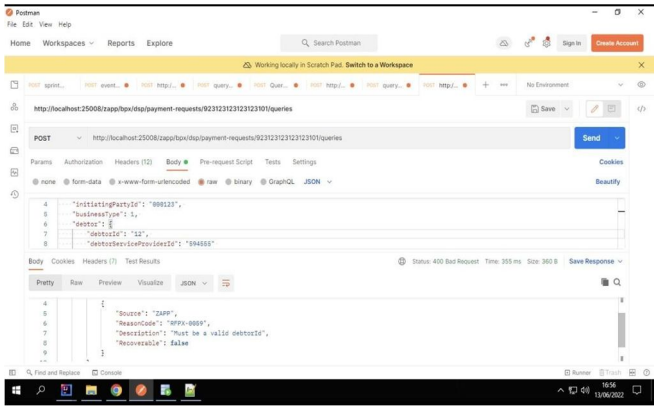


Figure 8: Invalid debtor ID for query initiation

Figure 8 depicts the invalid debtor id being passed in the body. This business rule will trigger when the debtor id is invalid or it is not present in the database. The validation is done with database if not found the BR rule 59 will be triggered.

VI. CONCLUSIONS

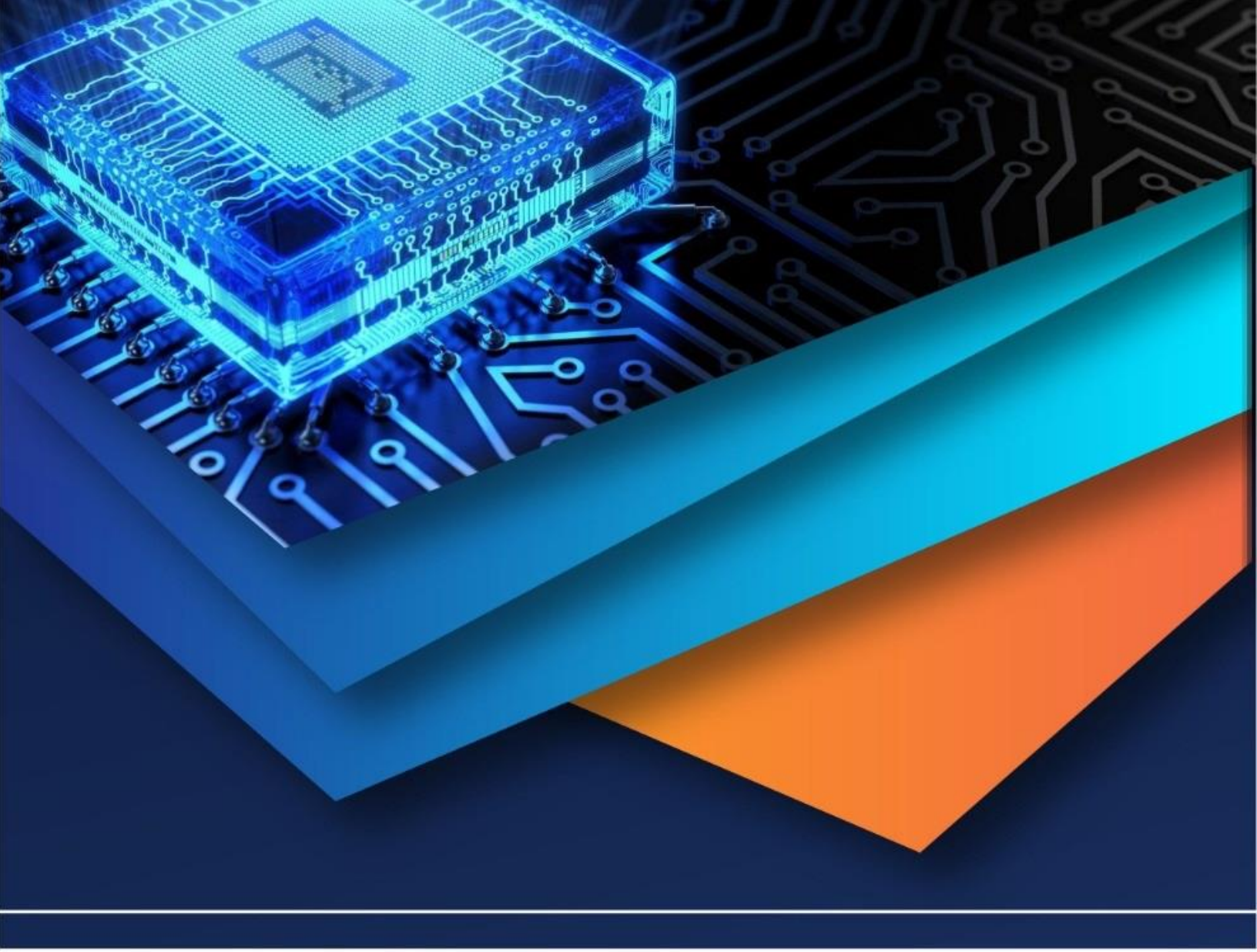
The aim of this work was to develop a systematic ordering, comprehensive and classification of issues in the area of financial services. The project deals with the implementation of the financial transaction which are used in money transfer or payment for services. The project explains in detail about the workings of the financial transactions. A customer will subscribe for the service which is provided by the customer service provider. The customer will have to pay the monthly fees for that service. It will be automatically debited from the bank account. The work of this project is for the customer to review the billing amount and also request for billing date extension and request for bill cancellation if needed. The complete process is divided into two parts which are inbound and outbound. There will be a queueing process which picks the customer the query and processes it one by one. The customer will initiate a query and after all the verification and validation the response will be sent to the customer.

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