SAVE THE SEVA

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Abstract: Fintech also called financial technology has been on the block and revolutionizing demand since it was first introduced. Multiple applications make complete use and application of fintech and apply to the real world. Fintech mainly deals with the use of technology in solving most financial problems and gaining a much better count on providing the most efficient services to real-time customers. The growing stimulant and popularity of Fintech have been to such an extent that almost the majority of software solutions utilize it. It has outgrown to develop a spur of payment solutions to most of the software technologies, educational institutions, and other public registration offices. Fintech necessitates having good development and understanding of the most recently adopted, digital methods of payments and enables every individual to have a clear understanding of financial services, online banking, mobile banking, and similar other requirements. However, certain problems comprehend with the utilization of Fintech. False charging by the operators working on a sector level, lack of awareness of using digitization payments among the public, and lack of knowledge of new systems adopted such as online payments, cryptocurrency are some of the challenges and roadblocks that are dealt with with the use of Digitization. To address these problems and bring an effective solution that can be utilized by everyone irrespective of their background, we have implemented a real-time model that can be used. The model is centralized and utilized mainly by public registration offices, payment services, and other institutions that have good crowds.

With the transition of the financial ecosystem in India, such as the implementation of demonetization in 2016, digitization has made more sense and is being used everywhere.The main objective of the model is to bring together the different methods of digital payments, and cashless integration of payments and understand their use cases effectively to build a stronger and sound financial ecosystem.

Keywords- Fintech, Centralized payment gateway, Payment Digitization/Cashless payments, Payment aggregators, Two-way Reconciliation, Data Visualization

I.   INTRODUCTION

Technology and automation are increasingly integral parts of a business or software architecture and have made a tremendous contribution to payment systems. The onset of the pandemic has also caused a steering shift of the payment operations to digital mode and helped to drive a digital transformation impacting the business sectors across the world.In the context of transforming towards digitalization, complying with advanced methodologies is equally important and the need of the hour in developing a top payment architecture.

Since the introduction of demonetization, the advancement in making digital payments has raised over the roof. According to the financial board statistics, an average of around 50% (Roughly around 250 million) of Indians make use of various types of digital methods for successful money transfers.This project mainly deals with the shift of payment methods from traditional cash payments to modernized cashless payments. It gives a wide range of perspective and awareness among the people and thereby increase the use cases.It also aims in developing transparent payment solutions for high-bound public-oriented operations such as public registration offices, Business sectors, and educational institutions.The project successfully deals with solving all the anomalies that are faced by millions of customers in various sectors, thereby creating a solid payment infrastructure that can apply to everyone.

The project adopts a transparent and efficient payment flow such as a Two-way reconciliation method that is applied to the system at both the user end as well as the server end.Overall, the project aims to solve most of the common anomalies faced by customers and develop to build a smooth and systematic payment ecosystem that can be easily integrated.

II.   RELATED WORKS

1.   **Understanding digital payments and the use cases it holds**: The paper [1] proposes a model that carries out a successful understanding of digital payments. From traditional bar systems to the Unified Payment Interface (UPI), India has come a long way in analyzing digital payments and successfully accepting the same. The payments vision 2025 further promises to elevate and advance the reality of digital transformation in payment services and bring to light the maximum benefits it holds.

The outreach of digital payment systems has been on a high, and financial statistics reveal an estimation of around 4018 billion INR made in 2016 when compared to 70 billion INR in 2012-13.

According to another survey conducted in March 2020, the total usage of digital payments in India has tremendously increased by 216% and 10% both in terms of volume and weight when compared to March 2019. This outgrown has given a better clarity in understanding the digital payment ecosystem.Digital payments are much more than implanting technology in payment systems. It aims to solve most of the human errors that cannot be solved by the traditional approach. Leveraging it for other business-oriented needs is where our model aims at.

2.   **Classification and analysis of digital payment]**: The paper [2] proposes a model and briefs out an analogy of various forms of digital payments and the methodologies used. Digital payments achieve an overall usage of digital technology in conducting any sort of financial transaction. It is a method that ensures the usage of advanced technology that is contactless for making payments. It can also be referred to as Electronic payments. The model incorporated speaks about various forms of digital payments that include Banking cards, Unified Payment Interface(UPI),

Digital wallets, Unstructured Supplementary Service Date(USSD), Real Time Gross Settlement(RTGS), National Electronic Fund Transfer(NEFT), Aadhar Enabled Payment System(AEPS). In a survey conducted by RBI Bulletin and Cash-Karo India, there is a clear indication that the E-Wallet payment method is more reliable for hundreds of thousands of customers than any other traditional method, mainly because of the smooth transparency it follows.
The project is built on leveraging the maximum from the digital payment infrastructure and ensuring a thorough outreach on the same.

3.   **Analysis of the anomalies or the drawbacks of the present payment infrastructure**: The paper [3] proposes a thorough and efficient model that explains the drawbacks faced by the current payment infrastructure and how they can be expertly corrected by implementing a cashless infrastructure. There are many flaws faced in the traditional payment ecosystem, the lack of digital methods being primary. Some other major areas of drawbacks include a lack of transparency and in-depth authentication of payment transactions which may result in overcharging or false charging, especially in Public Registration Offices involving bulk transactions. This has created a poor customer experience thereby hindering their optimum usage. Our model benefits by creating a smooth and very efficient payment framework that tracks every transaction carried out by the respective operators calculate the amount being collected and also visualizes the data, enabling a smooth user experience. We aim to create an effortless experience for maximum users without any hassle.

4.   **Solving the anomalies and building a solid infrastructure**: The paper [4] proposes a review that is followed after understanding the anomalies. It mainly aims to deal with the drawbacks and thus implement a solid payment infrastructure for all the use cases. Only the technical and scientific aspects are included in the review. After a thorough analysis and research, we aim to incorporate three ways of dealing with the problem that can be feasible. The main approach behind designing this three-way approach is to make use of the 2-way Reconciliation method in the payment systems.

This method is implemented to detect any form of error on either side of the entry, thereby creating a transparent transaction model in both the debit and the credit systems. Performing the 2-way or sometimes 3-way (depending on the number of the user ends) reconciliation method, understanding the workflow, and running the cron jobs is what this paper intends to articulate.

5. Implementing a solid payment infrastructure and conducting Data
Visualization for better clarity: The paper [5] proposes a model that uses a successful implementation of a 2-way Reconciliation process along with the present technology to build a solid plug-and-play model that can be integrated without a hassle. This model involves handling all the exceptions and promotes building a payment model feasible for every user, along with the option of writing feedback. The model is intended to be simple to implement so that all payment agencies and public registration offices can benefit from it to the greatest extent possible. It also provides an emphasis on

data visualization, which creates a better perspective on the business end. The data is analyzed and visualization models are created so that there is greater clarity on how the payment is split and how it can be successfully leveraged for the better.

III. OBJECTIVES

1. Digital payment solutions offer new opportunities for merchants and consumers to use social media to purchase and sell goods and services. This trend, known as social commerce, is helping to improve the financial health of the region.
2. Digital payment providers have a unique opportunity to play key roles in improving financial health and inclusion.
3. Digital payment solutions help in the discovery and in exploitation of opportunities to access wide market penetrations and to expand different markets.
4. This solution helps MSMEs in terms of strategic opportunities that represent a resource's best use through the sharing ecosystem to expand the business.
5. This understands the impact of digitization on the economy and society, which has pushed for rapid adoption to create significant business opportunities that have a substantial impact on citizens as temporal dynamics, by improving access to services and considerable connectivity with the global society and monetizing opportunities through digital payments.Payments Vision 2025, The potential of UPI has been recognized the world over by numerous authorities. Reserve Bank shall actively support the global outreach initiatives to expand the footprint of domestic payment systems by collaborating with relevant stakeholders (e.g. Central Banks, BIS, World Bank, other institutions, etc.).

IV. METHODOLOGY

Application Requirements: React is a front-end JavaScript toolkit for creating user interfaces based on UI components. It is free and open source. React.js and ReactJS are other names for it. It is maintained by Meta (previously Facebook), and a group of independent programmers and businesses. React can be used as a foundation for mobile, single-page, or server-rendered applications using frameworks such as Next.js. React apps require additional libraries to route and provide client-side functionality. React is a framework that only deals with state management and presenting this information to the DOM.

Django REST framework Django, a Free, open-source Python-based web framework, follows the Model-ViewTemplate architectural pattern. This reduces the complexity of web development, so you can concentrate on writing your app and not reinventing the wheel.
Django REST Framework is a flexible and powerful toolkit to build Web APIs. It makes serialization much simpler.

Django REST Framework is built on Django's class-based views. It's an excellent choice if you are familiar with Django. It supports implementations such as class-based views and forms, a model validator, and QuerySet, among others.

Heroku is a cloud platform as a service (PaaS) that supports several programming languages. Heroku, a platformas-a-service solution is generally easy to use. But it's most beneficial to businesses in specific situations. Heroku has a free service model for small projects. Also, tiered service packages exist for cases where more complex business needs must be addressed. The Heroku cloud service platform is based on a managed container (called dynos within the Heroku paradigm) system. It has integrated data services and a powerful ecosystem for deploying and running modern applications.

Material UI, a user interface framework based on Google's Material Design guidelines, is a very popular one. It is a visual interface framework that provides developers with a consistent way to create and maintain mobile and web applications. Material UI's main feature is its extensive library of pre-designed components, which can be customized to suit the specific needs of any project. These components include buttons and navbars as well as input fields and various data display elements. Developers will find it easier to create visually appealing designs by using the framework's guidelines for layout, typography and color schemes.

Material UI offers a wealth of tools to help you build and style applications. This includes a CSS in JS solution called JSS that allows developers to style their components without having to create separate CSS files. Developers can also customize the look and feel of their applications with the powerful theming system provided by this framework.
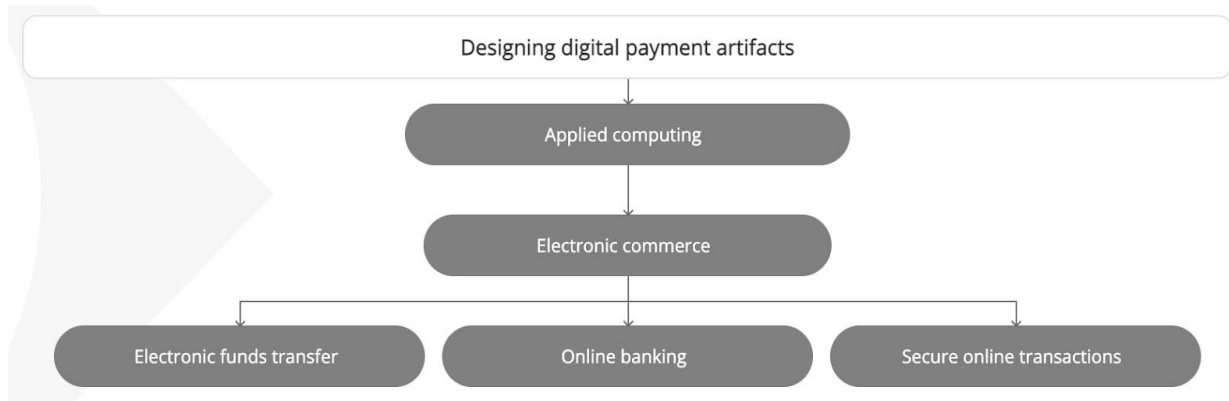
Fig1.1 Design of digital payment artefacts

Material UI is a powerful framework that allows developers to create functional and beautiful user interfaces. It is used extensively in the development and maintenance of mobile and web applications. It is especially popular with developers who use React, Angular and other JavaScript frameworks.

Cashfree, a financial technology company, offers developers a free API that allows them to integrate different payment and banking services into applications. Developers can accept payments from many sources including credit cards and debit cards. Cashfree API provides many tools to manage and track payments. These include the ability to issue refunds, track transaction statuses and generate invoices. The API supports multiple languages and currencies, which makes it easier for developers to create global payment solutions.

The Cashfree API's high-security level is one of its key advantages. To ensure the security of transactions, the API employs advanced encryption and fraud prevention methods. It offers compliance and regulatory features such as support for Know Your Customer (KYC), and Anti-Money Laundering(AML) requirements.

The Cashfree API is an excellent and flexible tool for developers who want to integrate banking and payment capabilities into their applications. It's easy to use, secure, and suitable for many industries and use cases.

1.   **UPI (Unified Payments Interface)** is a digital payment solution developed by the National Payments Corporation of India (NPCI) that allows individuals and businesses to make and receive payments securely and efficiently. The methodology for implementing UPI payments involves the following steps:

•   Setting up a UPI account: To use UPI payments, individuals and businesses need to set up a UPI account through a participating bank or financial institution. This typically involves providing identification and other required documentation and linking a bank account to the UPI account.
•   Installing a UPI app: UPI payments can be made through a variety of apps, including the NPCI's own BHIM app and other third-party apps such as Google Pay and Paytm. To make UPI payments, users need to install one of these apps on their device and link it to their UPI account.
•   Making a payment: To make a UPI payment, users need to enter the recipient's UPI ID or scan a QR code. The payment can then be confirmed using a one-time password (OTP) or other authentication methods.
•   Receiving a payment: To receive a UPI payment, users need to provide their UPI ID to the sender. The payment can then be confirmed using a one-time password (OTP) or other authentication methods. Overall, the methodology for implementing UPI payments involves setting up a UPI account, installing a UPI app, and making and receiving payments using the UPI ID and other authentication methods.

2.   **Two-way reconciliation** is a process of reconciling financial transactions between two parties to ensure that they are accurate and complete. It is commonly used in accounting and financial management to ensure that all transactions are accounted for and that there are no discrepancies or errors.
•   One common way to perform two-way reconciliation is through the use of a cron job analysis. A cron job is a scheduling utility in a computer operating system that allows tasks to be automatically performed at a predetermined time.

In the context of two-way reconciliation, a cron job can be used to automate the process of comparing financial records between two parties on a regular basis.

• For example, a cron job could be set up to automatically compare the financial records of a company and its supplier every week. If any discrepancies are detected, the cron job could trigger an alert or notification to notify the relevant parties of the issue and initiate the process of resolving it.

Overall, two-way reconciliation is an important process for ensuring the accuracy and completeness of financial transactions, and using a cron job analysis can help to automate and streamline this process.
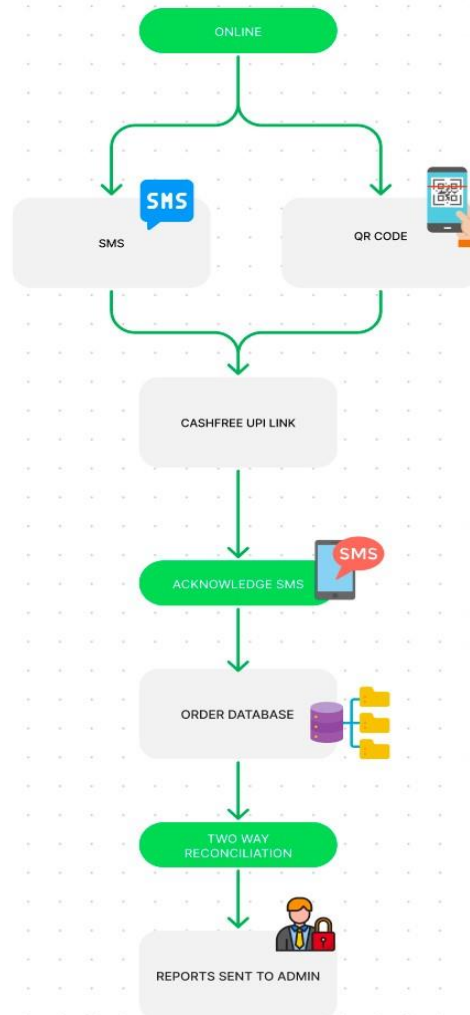

Fig 1.2 Payment Flow

3. **Data visualization** is the process of using graphical and visual elements, such as charts, graphs, and maps, to represent and communicate data. In the context of business metrics from a market point of view, data visualization can be an effective way to understand and analyze market trends and patterns, as well as to communicate this information to others. There are many different types of data visualizations that can be used to represent business metrics from a market point of view, including:

• **Line graphs**: Line graphs are useful for showing trends over time, such as changes in sales or market share.

• **Bar charts**: Bar charts can be used to compare different metrics, such as the market share of different competitors.

• **Pie charts**: Pie charts can be used to show the proportions of different market segments or the distribution of market share among different competitors.

• **Maps**: Maps can be used to show the geographical distribution of market share or other metrics.

• **Scatter plots**: Scatter plots can be used to show the relationship between two variables, such as the relationship between price and market share.

Overall, data visualization is an important tool for understanding and communicating business metrics from a market point of view. It can help to identify trends and patterns and to communicate this information to others in a clear and effective manner.

4. **The conversion of traditional payment systems to a cashless architecture** involves replacing traditional payment methods, such as cash and checks, with electronic payment solutions. This can involve the use of credit and debit cards, mobile wallet payments, online bank transfers, and other digital payment methods.

There are a number of reasons why countries and businesses may choose to convert to a cashless architecture, including:

• **Enhanced security**: Digital payment solutions can offer enhanced security compared to traditional payment methods, as they often use encryption and other security measures to protect sensitive financial information.

• **Reduced cost**: Electronic payment solutions can be more cost-effective than traditional payment methods, as they can reduce the need for physical checks and cash, which can be expensive to process and distribute.

• **Increased efficiency**: Digital payment solutions can help to streamline financial processes and improve efficiency, particularly for businesses.

Overall, the conversion of traditional payment systems to a cashless architecture can offer a number of benefits, including increased convenience, enhanced security, reduced cost, and increased efficiency. However, it is important to consider the potential challenges and risks associated with this conversion, such as the need to ensure that all individuals and businesses have access to electronic payment methods.

6. **Biometric authentication** is a type of security measure that uses the physical or behavioral characteristics of an individual to confirm their identity. Some common examples of biometric authentication include:

• **Fingerprint scanning**: This involves using a fingerprint scanner to compare the fingerprint of the user to a stored reference image to confirm their identity.

• **Facial recognition:** This involves using a camera and specialized software to compare the user's facial features to a stored reference image to confirm their identity.

• **Voice recognition:** This involves using a microphone and specialized software to analyze the user's voice and compare it to a stored reference sample to confirm their identity.

• **Retina scanning:** This involves using a specialized camera to scan the user's retina and compare it to a stored reference image to confirm their identity.

Biometric authentication can offer a number of benefits, including increased security and convenience. However, it is important to consider the potential risks and challenges associated with this type of authentication, such as the potential for false positives or negatives and the need to protect the privacy of biometric data.

7. **AEPS (Aadhaar Enabled Payment System)** is a digital payment solution developed by the National Payments Corporation of India (NPCI) that allows individuals to make and receive payments using their Aadhaar number and biometric authentication. The methodology for implementing AEPS payments involves the following steps:

• **Setting up an AEPS account**: To use AEPS payments, individuals need to set up an AEPS account through a participating bank or financial institution. This typically involves linking their Aadhaar number to the account and enrolling their biometric data.

• **Installing an AEPS app**: AEPS payments can be made through a variety of apps, including the NPCI's own BHIM app and other third-party apps such as Google Pay and Paytm. To make AEPS payments, users need to install one of these apps on their device and link it to their AEPS account.

• **Making a payment**: To make an AEPS payment, users need to enter the recipient's Aadhaar number and confirm their identity using biometric authentication. The payment can then be confirmed using a one-time password (OTP) or other authentication methods.

• **Receiving a payment**: To receive an AEPS payment, users need to provide their Aadhaar number to the sender. The payment can then be confirmed using biometric authentication and a one-time password (OTP) or other authentication methods.

Overall, the methodology for implementing AEPS payments involves setting up an AEPS account, installing an AEPS app, and making and receiving payments using the Aadhaar number and biometric authentication.

8. **Payment link sent via SMS** - SMS (Short Message Service) is a text messaging service that can be used to send payment links to customers as a way for them to make payments. Here is an example of how this process could work:

• The business sends an SMS to the customer with a payment link. The SMS could include a message explaining the purpose of the payment, such as the amount due and the due date.

• The customer clicks on the payment link in the SMS. This takes them to a secure payment page where they can enter their payment details, such as their credit card or bank account information.

• The customer confirms their payment. Once the payment details have been entered and verified, the customer can confirm the payment by clicking on a button or entering a one-time password (OTP).

• The payment is processed. Once the payment has been confirmed, the payment is processed by the payment gateway, and the funds are transferred from the customer's account to the business's account.

Overall, using SMS to send payment links to customers is a convenient and efficient way for businesses to facilitate online payments. It can be particularly useful for businesses that need to collect payments from customers who may not have access to a computer or other electronic device.

9. **IVRS calls to inform the user about payment charges** - IVR (Interactive Voice Response) is a technology that allows a computer to interact with humans through the use of voice and touch-tone input. One way that IVR can be used is to inform users about payment charges. Here is an example of how this process could work:

• The user initiates a payment transaction. This could be done through an online payment platform, a mobile app, or by calling a phone number and following the prompts.

• The IVR system prompts the user to confirm their payment. The IVR system could provide the user with information about the payment, such as the amount due and the payment due date.

• The user confirms their payment. The user can confirm their payment by pressing a key on their phone or speaking a command to the IVR system.

• The IVR system informs the user about the payment charges. The IVR system could provide the user with information about any fees or charges associated with the payment, such as transaction fees or currency conversion fees.

• The payment is processed. Once the user has confirmed their payment and been informed about the charges, the payment is processed by the payment gateway, and the funds are transferred from the user's account to the recipient's account.

Overall, using IVR to inform users about payment charges is a convenient and efficient way to provide this information to users who are making payments through a phone-based system. It can help to ensure that users are aware of any fees or charges associated with their payment and can make informed decisions about whether to proceed with the payment.

Applications - Digital payment solutions have a wide range of applications, including:

• **Retail payments**: Digital payment solutions can be used for online and in-store retail transactions, allowing individuals to make payments using their electronic devices.

• **B2B payments**: Digital payment solutions can facilitate payments between businesses, streamlining the process of paying invoices and other financial obligations.

• **P2P payments**: Digital payment solutions can enable peer-to-peer payments, allowing individuals to make and receive payments directly without the need for a financial institution.

• **Mobile payments**: Digital payment solutions can be used to make payments using mobile devices, such as smartphones and tablets.

• **Cross-border payments**: Digital payment solutions can facilitate cross-border payments, allowing individuals and businesses to make and receive payments from anywhere in the world.

• **Online payments**: Digital payment solutions can be used to make payments online, including for ecommerce transactions, subscriptions, and other services. Overall, digital payment solutions have a wide range of applications, including retail, B2B, P2P, mobile, cross-border, and online payments.

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