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**WHY CARRY MULTIPLE CARDS? – ADC IS HERE**

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**Abstract:**

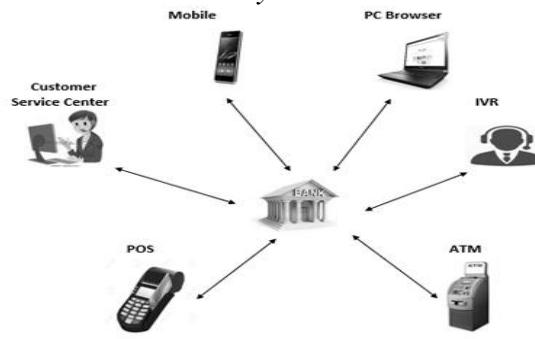
The immediate alternate to cash transaction people feel is the card system. Having multiple cards and remembering PINs for all those has become a burdensome problem for the users. If a common PIN is being set and used for all the debit cards, chances are high to trace and steal the money. To overcome all these annoyances and to make the transactions easier and safer, herewith we propose a new system where a Common card will be issued by The Monetary Authority for all the customers that synchronize all of their bank accounts, irrespective of the type of account.

Thus, proposed system will reduce the burden of the banks in providing a debit card to its customers and reduces the load of the banks server. To conclude, the customers will also get benefitted in carrying out a single card for all their payments.

**Keywords:** Payment Service Provider (PSP), Assimilated Debit card (ADC), Assimilated Web Interface (AWI), Assimilated Web Server (AWS), Assimilated Data Warehouse (ADWH).

**1. Introduction:**

As there is no restriction for people to have as many bank accounts as they want for various purposes, situation leads to various issues<sup>1,2,3</sup>. One primary issue is people's valuable time gets wasted by going directly to the bank to do various transactions. To help them save time, The Monetary Authority of many countries have taken enormous measures in introducing innovative technologies that will enhance the high customer services<sup>4</sup>. The cashless transaction is promoted in various countries<sup>5</sup>. Figure -1 shows the various modes of technologies provided for the customers to interact with the bank.



**Figure – 1. Means To Interact With Bank.**

To use these sorts of available technologies, the customers must remember all the confidential details like username, password, PIN, answering for secret questions and all other techniques for all their bank accounts. Thereby, all banks will advise their customers to change their secret PIN and passwords at a regular interval. Amongst all, the primary technology being adopted by mass number of people is the plastic cards<sup>6</sup>. Plastic cards has taken so many forms based on the requirements of the people<sup>7</sup>.

One such important type is Debit cards that will be given by default for the customer's convenience, the time they open a bank account. To secure the transactions using this card, a Secret PIN is provided with each card and it is advisable to change the PIN at a regular interval. Therefore, it is the responsibility of an individual to remember the respective PIN of the concern debit card.

If it has been forgotten or wrongly typed for the limited number of times, then the card will be blocked and cannot be used thereafter, until it gets cleared by the authorized bank. To provide this card payment system as a service, for each debit card, an annual fee is levied from the individuals. This becomes another disadvantage of maintaining multiple debit cards. Our proposed system is designed to overcome the above mentioned problems.

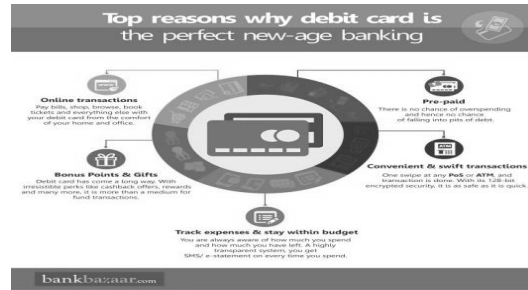
This paper has been categorized in the following manner. Section 2 discusses the Background study. Section 3 covers the inconveniences in the existing system. In Section 4, the architecture and features of the proposed system are elaborately discussed. Section 5, provides the process flow of ADC in various transaction media. Section 6 compares and list the advantages of implementing the proposed system, over the traditional card system. Section 7 ends with our future work.

## **2. Background Study:**

**Purpose of Debit cards:** <sup>8</sup>Has given a clear picture of what a Debit card is and its usage. With a complete statistical report<sup>9</sup> says the importance of debit cards. These are widely used by a huge number of consumers even though so many

other forms of plastic cards have been available in the market. The following are some of the means of how debit cards

can be used in day to day life.



**Figure – 2. Means of How Debit Cards Can Be Used.**

The figure 2 explains the need of debit cards in real time. <sup>7</sup>Has given a detailed view of what a debit card is, its types and top banks providing debit cards to its customers. The primary advantage of using debit cards over credit cards is that it will not lead a customer to overspend there by leading him/her into the pits of debt. Even a statistical report<sup>10</sup> says that number of credit cards issued in countries like India is growing in a rapid manner when compared with debit card, only people living in metropolitan cities, having good earnings to return the debt are only claiming for it. But, banks are purposefully encouraging people to use credit cards, because of the interest they could get from the person who fails to return the credited amount on time. Despite all these issues, if a person wants to have a credit card, he/she must always remember to pay the bills on time, to overcome all these interest charges. Therefore, to be on the safe side, it is advisable for the common man to have a debit card. If he has multiple accounts, multiple debit cards will be provided along with various PINS. <sup>11</sup>S.RajarajanEt.al, has suggested a technique, where an integrated credit cum debit card can be devised. However, this approach has overcome the problem of carrying multiple cards, it has got few drawbacks. It is the cost involved in engineering the card. Since the manufacturing cost of this smart card would be higher than the normal one, higher service charges will be levied from the customers' bank account. If the card is lost, an affordable charge will be deducted to reproduce a new card. Another issue with this technique is, the mechanism involved in operating the card. This card interacts with the system multiple times and the crucial part of verification is done on both sides. If either of the side gets failed, the transaction could not be initiated or done. According to a common man point of view, the accessing mechanism is also slightly complicated. A well- educated or a person having sufficient knowledge only can use this card. While using debit cards over the net, to make the consumers feel safer, banking sectors have made a tie up with Payment Service/Security Providers (PSP) that authenticates the transactions using “digital certificates”<sup>12</sup>. A little bit modernized, a sort of debit cards has been introduced and widely used across the globe called as smart cards that

make use of a “chip” embedded on the card. That chip holds the details of the customer. The significant disadvantage is the cost of manufacturing and maintaining it.

The above literature has its own strengths and weaknesses. The main drawback is that, all are comparatively costlier.

### 3. Inconvenience faced in accessing the existing system:

1. As the number of bank accounts increases, the burden of the bank server grows to a greater extent.
2. The date of renewal of existing card also plays a major role as the part of the banker and the customer.
3. For each and every card, a nominal annual fee is being charged from customer’s account.
4. Another difficulty in using the Debit card is in POS Terminals, where a service charge is being deducted while swiping the card.
5. The same problem also arises, when the customers do the fund transfer using debit card over online shopping.

### 4. Proposed System

In order to overcome the above lacunas, the proposed system has been designed in the following manner, as depicted in figure-3.

It consists of the major components namely:

1. Communication medium (ATM, Mobile, POS, Internet via PC).
2. Servers for each medium to process the request that communicate with the AWS (Assimilated Web Server).
3. Payment gateways to authenticate secured fund transfers.
4. Application Layer - AWI (Assimilated Web Interface).
5. AWS (Assimilated Web Server).
6. ADWH (Assimilated Data Warehouse).
7. Individual Banking Databases.

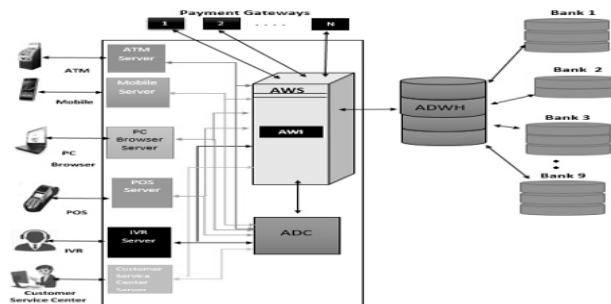


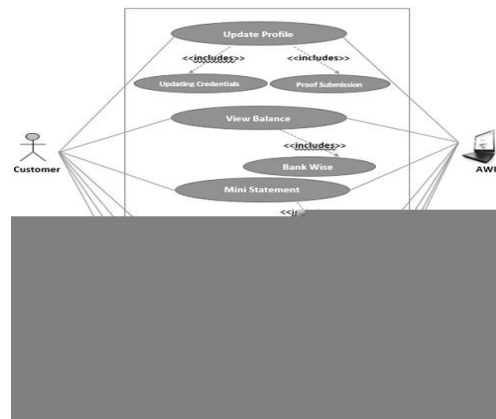
Figure – 3. Overall System Architecture.

#### 4.1 How The System Works:

The proposed system will work in the following manner:

##### 4.1.1AWI:

Figure – 4 shows a scenario of how the AWI interacts with the customer. This web application can be loaded either via a pc browser or any handheld devices like smart phones, tablets etc., For instance, if a customer wants to update his/her details, first they have to authenticate themselves by signing up into the AWI. Immediately a Unique Customer Identification Number (UCIN) will be generated after authenticating via his/her mobile number or e-mail. Then only he/she can proceed further. During the initial sign up, the user must add at least one of his/her bank account, along with any of the proof detail that includes Aadhar Number, PAN, Driving License, Passport Number, Ration Card Number etc.



**Figure – 4 AWI - USE CASE Diagram.**

Next, the user will be allowed to enter into his/her AWI account, where it validates all his/her previous details and authenticates it. It continues further asking important details that has to be given by the user like PAN, ration card, driving license etc. If any of the data given is wrong, proper notification will be given to user on the interface.

Customers have to submit all of their proof details within certain time, whereas they have been given a privilege of adding their new bank account details at any time. Our system is capable of integrating a maximum of 9 Bank Accounts in a Single Card.

Before initiating the first transaction on a day, the customer must generate an Online Shopping Password (OSP), either via this interface or through Short Message Service (SMS) that will be sent to his/her registered mobile number. This OSP will lasts till that day's midnight and the customer has to enter use this pin wherever the customer performs his/her transaction. If OSP has been forgotten, the customer can regenerate at any time.

In addition to all these, customers will also be given a service to do fund transfer between his/her registered bank accounts. The Electronic Fund Transfer (EFT) that includes National Electronic Fund Transfer (NEFT), Real Time Gross Settlement (RTGS), and Immediate Payment Service (IMPS) are all applicable as per the traditional methods.

#### **4.1.2 ADC:**

A card will be designed that integrates all of the account details of the customer. After a successful integration and validation through AWI, the authorized card issuer will design a unique debit card numbering 22 digits, based on the customer UCIN and other credential details. The debit card will be embraced with this unique 22 digit number on it. The number is designed such that the card manufacturer and the card holder can be traced. To check for the authenticity of the card number a parity check digit is also provided. This number will no way help to trace the details such as Customer Account Number or the number of Accounts. For security purpose, each card will be given with a secret PIN number. This single PIN number along with OSP generated via mobile, is used for all the transactions done via ATM, POS, and Online.

The debit card issuer keep tracks of all the transactions done by the customer. If no transaction is carried out in any particular account, then an intimation is given to the customer, with a warning message to close it within some time duration.

#### **4.1.3 AWS:**

A secured Web server is used to transfer the request and respond between the user and server. The Assimilated web server works in the similar way like other web servers. To make high *throughput* (i.e.) time taken by the AWI and AWS to handle enormous transactions per second and *low Latency*, the actual time taken by the client's request to reach the Web server, the proposed system maintains a dedicated AWS.

#### **4.1.4 ADWH:**

This is the core component that maintains all the customers' bank accounts and personal details. Once the customer updates his/her bank accounts, automatically this component pulls the necessary data from the individual bank databases, the banks that allow sharing their customer's details with ADWH. Therefore, it acts a middleware between the customer's individual bank accounts and them. If the customer's detail has not been synced properly with the one what he/she has in other banks, a notification will be sent to the customer until he/she updates the information correctly. For

instance, if a transaction is to be performed by using the ADC, it gets the necessary information from the ADWH that

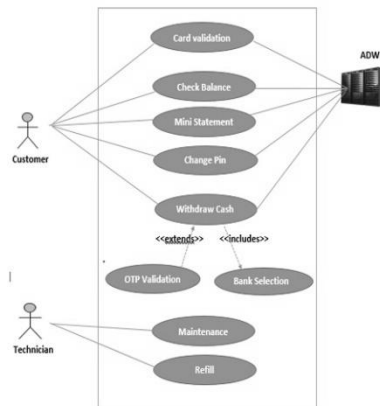
has been authenticated via AWS.

## 5 Process Flow:

### 5.1 Transaction via ATM:

Figure - 5 illustrates the concept of how a customer can use his/her ADC at ATM.

1. When a card is inserted into ATM, it asks for security PIN for validation.
2. After the card is validated, the transaction phase will be initiated.
3. ATM displays all the registered Bank names of the customer, its balance along with the customer will be provided an input area where he/she can enter the amount to be withdrawn.



**Figure – 5 ATM - USE CASE Diagram.**

4.Finally, the system will show the total amount to be withdrawn. Once, it is confirmed, the customer has to enter the OSP he/she received in the registered mobile number.

5.Instead of getting OSP for authentication, a biometric system is also provided as an alternative for customers' convenience<sup>13</sup>.

6.The conventional operations of ATM remain the same.

### 5.2 Transaction via POS:

Figure – 6 illustrates the concept of how a customer can use his/her ADC at a shopping mall.

1. Once, the consumer completes his/her shopping, he/she has to move to the checkout section to do the payment.
2. Only at the time of payment, the cashier swipes the ADC into the POS terminal.
3. The user should type the secret PIN for authentication.

4. Once verified, the cashier should enter the purchase amount.
5. Afterwards, the POS terminal will be handed over to the consumer to enter the banks from which the amount can be transferred.
6. Here, for the consumer’s convenience, the purchase amount can be transferred from a maximum of any of his/her 4 banks’ accounts.
7. This process continues until the purchase amount and the sum amount typed by the consumer should tally.
8. Immediately, OSP has to be entered.
9. After successful validation of card, PIN, purchase amount and the OSP, the consumer has to insert his/her digital signature device to authenticate the transfer.
10. Instead of getting OSP for authentication, a biometric system is also provided as an alternative for customers’ convenience<sup>13</sup>.

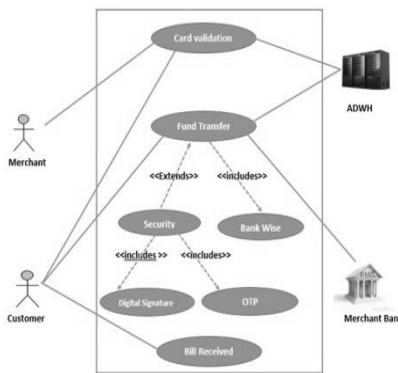


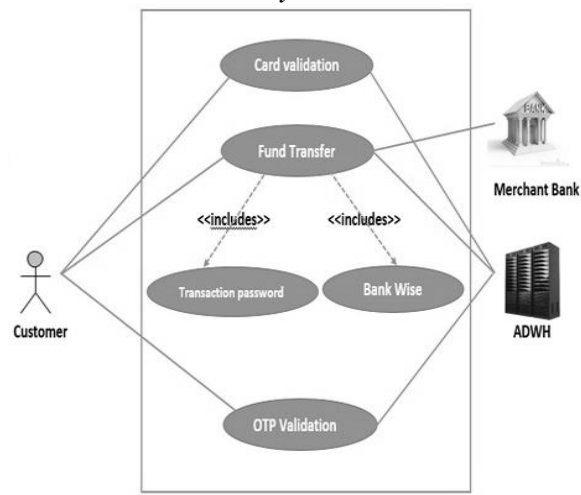
Figure – 6 POS - USE CASE Diagram.

### 5.3 Transaction via PC/Mobile Browser:

Figure – 7 illustrates the concept of how customers can feel comfort with online transaction, using the ADC.

1. After the traditional verifications like the card number, its validity, Card Verification Value (CVV) and card-holder name by the corresponding Online Shopping Web Site, the Payment mode will be initiated.
2. The session lasts only for limited time duration, where the customer will be entering into the secured web page.
3. The consumer will be given a privilege to select the maximum of 4 bank accounts from where the purchase amount can be deducted.
4. This process continues until the purchase amount and the sum amount typed by the consumer should tally.
5. Immediately, OSP has to be entered.





**Figure – 7 Using ADC online - USE CASE Diagram.**

**6. Salient Features Of The Proposed System:**

The proposed Debit Card System provides more benefits in both Government and Customer point of view.

1. The system limits the number of bank accounts being used by the customer.
2. Manufacturing and maintaining of a huge number of plastic cards will be reduced.
3. On the customer’s perspective, the problem of remembering the login credentials and secret PINs for all of his/her bank accounts is considerably reduced.
4. On the perspective of Monetary Authority, tracing a customer has been made very easy, since the proposed system logs the vital credentials such as Citizen card, driving license, PAN, voter id etc.,
5. The generation of OSP per day facilitates the added security for any transaction.
6. On the system’s perspective, it reduces the generation of OSP for all the bank accounts as and when needed by the customer.
7. The proposed system helps The Monetary Authority to monitor the transactions in a transparent manner. Thus it plays a vital role in developing a corruption free world<sup>10</sup>.

**7. Future enhancement:**

The proposed system consists of all the traditional way of banking. In addition to that, it maintains the customers’ details at a centralized server. As the opening of bank accounts increases drastically day by day, the proposed system can be ported to the cloud environment by clustering the customer, based on their geographical regions. Therefore, high throughput and low latency can be achieved.

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