Business Strategies in Cloud Computing – Remote Banking Documentation

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***Abstract*—In Ireland till today people are visiting the bank and waiting for some time to book an appointment and again visiting another day to get the opening of the account done. In this paper we have proposed a solution for this and came up with the steps to implement the solution in business form. The solution for the problem is remote banking documentation, this solution is conceptually formulated as a web application that does the entire work of opening a bank account.**

Keywords: Remote banking, uploading banking documents, online banking appointment.

INTRODUCTION

Cloud has become a game changer in recent years. Almost all companies came to an idea that if their product is present in cloud then they can get victory in their business. Cloud has solved all the unsolved problems on the IT industry. The problem addressed here is opening a bank account in offline. All the people in Ireland go to bank and wait for long time to book an appointment and again visit some other day to create an account in that bank. In this paper we will be discussing about the solution prototype, where users can book their appointments in online and upload all the necessary documents and attend a video call with banker for opening the bank account. All the steps in building a business prototype were explained with respect to our problem and solution.

HIGH TECH BUSINESS INNOVATION

Research & Analysis

1. User and Urgent Requirements

In the banking sector for all the activities every customer of the bank should go in person to book an appointment for completing the work. And also, in case opening an account in a bank, requires some documents, people might forget those documents while going for opening the account. The user segment who faces this problem are in Ireland who want to use the banking services. The urgent requirement for this problem is people should know exactly what the documents are needed and, is there any way to open a bank account quickly. And also, for bank people, they need to find a quick way to verify documents and increase their customer part.

In Ireland people have walked all the way to the bank to open an account but before that they have to get an appointment from the bank to open the account. To get the appointment also they have to walk in person to the bank with supporting documents. This was a major problem for the people in Ireland and also in case of international students or working professionals who come to Ireland for work also goes through this problem. And sometimes people might forget the supporting documents that are mandatory for opening the bank account. The customer segment that faces this issue are the people in Ireland. This applies to all the age limits who can open a bank account in Ireland, this includes international students and working professionals who come to Ireland. The urgent requirement for this problem is to know where is the nearest bank that opens an account for the people, and it should be near to their living area so that it will be easy for them to open an account. The documents necessary for opening an account will be different in case of international students and working professionals and businesspeople. So, the information about the necessary documents is also an urgent requirement. We can identify this as an urgent requirement by talking to people who live in Ireland, by talking to the employees of different banks about the procedure to open a bank account.

2. Existing Alternatives

People directly walked into the bank to know the procedure and they asked to come again on another day to open a bank account. In case if they miss some documents then they are asked to come again on some other day. Sometimes people also book appointments through phones.

In case, if a customer has decided to open a bank account and if that customer is already an Irish citizen then the customer might know the place of the bank to open the bank account. Then he should walk all the way to the bank to open the bank account but before that he should book an appointment with the bank. This makes people spend a lot of time in it. Since it is really a tedious process there are some third parties who book an appointment on behalf of customers with the bank. Because of this, customers must spend some money for them. The other way is that people used to call the bank directly and book an appointment to open an account. The disadvantage here is that the bank people do not know where that customer lives so they might ask them to come to a bank where the distance from the home to the bank will be far. Another way the customers book

appointments is by customer support, many banks do not do this but, in some banks, this is done, the disadvantage here is for some people who have hearing problems cannot do this. So, no proper solution was done other than walking directly to the bank and book an appointment. The above solution has some advantages also in its own way. For example by walking directly to the bank and booking an appointment though it has more manual work it is the proper way of booking the appointment, this is safer, and people can walk to their nearest bank. And booking through third parties has an advantage of saving some time. So one common solution to reduce the entire manual work is not proposed by anyone. After thinking of many alternate solutions, we can conclude that there should be one possible solution that addresses the drawbacks of the previous solutions like spending more time by walking to the bank, booking through an agency and customer support.

3. Market Gap

Even though there are some alternate solutions present, there are few companies that have decided to develop a website that addresses these problems. But still they faced problems in finding the exact requirements of different banks.

There are many companies trying to develop solutions for this problem. But they fail every time in finding the exact requirements of the bank that customers should have. For example a company started to collect the requirements from the bank to solve this issue, but the problem here is the solution is not addressed globally like the requirements of different banks get differed. Some companies also tried to get tied up with banks and develop solutions for it, but the correct solution is not addressed. Some companies produced a voice over call solution to book an appointment, but this voice over has failed because the correct procedure was not followed. The key benefit here missing is in case if they upload the documents then it should be present with the bank, if the customer support is provided then the third party should not reveal customer information to anyone else. And the main benefit missing is there should be less manual work for both the bank and the customer.

Customer Persona:
Name: Francis Xavier
Age: 27
Occupation: Student
Country: Russia
Gender: Male
Qualification: B.Sc.
Experience: Two years' experience as a software engineer in a reputed company.
Currently Place: Ireland
Hobbies: Solving sudoku, hearing songs, watching movies.
Goals: Complete a master's degree and work for the world's biggest IT company.

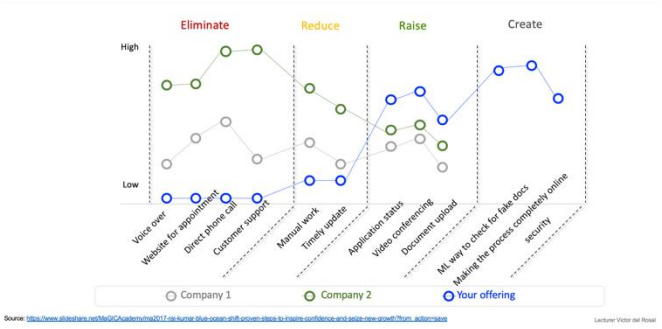

Fig1: Strategy Canvas Analysis

Design

4. Solution Concept

Our product is a B2B product which helps both bank people and also the people who want to open a bank account. Using our application bank people can reduce their effort in verifying the documents and applicants can open the bank account online itself.

In Ireland, if people have to open a bank account, they have to first book an appointment with the bank and after that, they have to go personally to the bank to submit the document and fill in the required form and if the document is not proper they have to come again within the given time from the bank and do the process again till the requirement has been completed. It is a time-consuming process and it takes weeks to open a bank account. This was a major problem and challenges faced by the people in Ireland and people coming to Ireland for the jobs and studies also faced the same challenges. So, to overcome this we came with an idea to create an online banking documentation system. We will create a web application which helps customers to submit their required document online and fill the form online for opening a bank account. The document will be verified online through the backend machine learning process and the person will have the bank account open without going to the bank. This solution requires that banks must tie up their business with us for the online document submission process, then only people will be able to open a bank account through our web application. This will be a business to the business concept.

5. Technology Overview

The technologies used in our application is python. Our application will be designed in python for back-end and for front-end it will be designed in ember.js and the application will be hosted on AWS. The application also has some AWS components.

The technology overview denotes about the technologies that we are using in the application to build our prototype. The application will be designed in MVC architecture. The controller of the application will be written in python language. Python would be best for our application because some of the machine language algorithms to check the expiry dates of the documents will be written in python. So it will be compatible and will be efficient when integrating those ML in our application. The front-end of the application will be written in ember.js. This is used in almost most of the MNC's because it has some pre-build libraries that makes the application better and it makes the user experience of the application to perform

better. The database used to store the credentials of the applicants and the bankers is PostgreSQL which is a NoSQL. This entire application will be deployed on AWS cloud in EC2 instances with Linux environment on it. The application also features Amazon Textract which is used to verify the expiry dates in different documents, and it has integration with Amazon Sagemaker to check if the documents are fake or not. Skype integration is present in the application for the purpose of video conferencing. And finally, we will be having a private cloud to store the uploaded documents of the applicants.

6. User Interface (Front-end)

This is the place in our application where the user interacts with the application. All the front-end screens like booking page, video conferencing page, uploading the documents page will be seen. All these front-end will be designed in ember.js.

Applicant:

- User will login/signup to our web portal
- The user will select the bank in which the user wants to open a bank account.
- There will be four options to select Open a bank account, Online video appointment, Tracking Debit/Credit card and Tracking ATM and mobile PIN.
- If user select open a bank account, it will go to the next page where the user will see the required document and after the user has the required document, user will go to the next page where the user has to fill the form and upload the required document if the document is approved the user will get the confirmation of the online video appointment with the banker. If the document is not approved the user will be redirected to the required document page.
- If the user selects the online video appointment, there will be an online video chat with the user and the banker. In this, the user can ask the query regarding the bank and to know more about the benefits.
- If the user selects a tracking Debit/Credit card, the user will be able to track the debit/credit card and mobile banking pin delivery status.

Banker:

- Banker will login to our web portal
- The banker will select the online video appointment
- The banker will chat in online with the user and take the picture of the live face of the user, verify the document again, telling the user about the bank and its benefits, answering the query of the user if any.
- In the video chat, the banker will decide and confirm the user.

Fig 2: Front-end application workflow

Develop

7. Technical Architecture

A technical architecture diagram that describes the application flow with hardware and also tells about the cloud components that are used in the application. Third party integrations are also done in this application for the purpose of video conferencing.

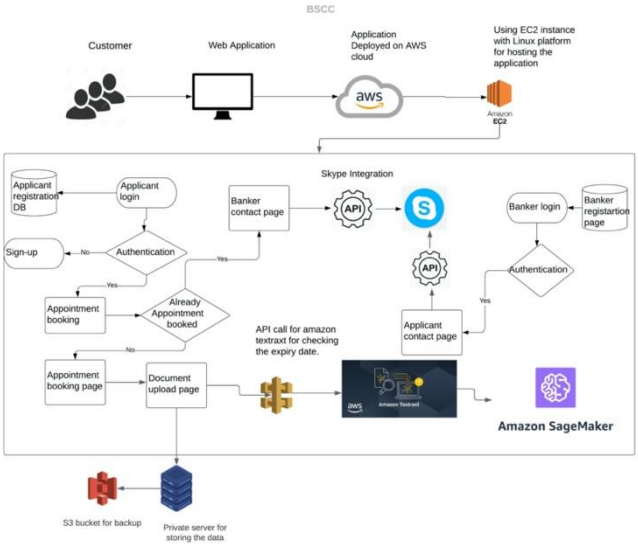

Fig 3: Technical Architecture BACK-END Workflow

In the given technical architecture diagram we have included, in which cloud, the application is deployed and also what type of instance is used. In our case the application is deployed on AWS cloud and hosted on EC2 instance with Linux environment since it is less vulnerable. Through this AWS cloud customers will login to the application through the website. In the applicant side when they upload the documents it automatically checks for the document's expiry date using Amazon Textract with the help of API call and also the application will check for fake documents using Amazon Sagemaker by training it through machine learning ways. This will reduce the time for the bankers to verify the application. And after the appointment is booked, with the help of the appointment number, applicants will be redirected to the video call page where skype, a third-party integration is done.

These uploaded documents will be saved on a private cloud so that aws cloud will not have access to it.

8. Technical Specification

Initially customers can access the web application with help of the domain name which is provided to them. This project has been developed in AWS cloud platform. AWS provides the on-demand cloud computing platforms, it provides pay-as-you-go services. For this project we have used AWS Elastic Compute Cloud (EC2) on-demand service. We have used the g3s.xlarge instances with ubuntu 19.10 OS in the Europe region. The application's backend has been created with latest python 3.8 which is designed with features to facilitate data analysis and machine learning which is very important for our project and for the frontend ember.js has been used. For Database we are using PostgreSQL. To scan the document and to check the validation of the date and content of the customer, AWS Textract is used, which is a machine learning process, from the backend it automatically collects the text and the data from the scanned document and it goes to simple optical character recognition (OCR) process to identify the if date is expired or not in the customer's document. To validate if the document is fake or original, we have used the AWS Sagemaker service which is also a machine learning tool. We will take the document from the AWS Textract and using the algorithm in AWS Sagemaker, the application will identify if the document is fake or original. AWS API gateway is used to call the AWS Textract machine learning service in the AWS cloud platform. For video conferencing between the banker and the customer we have used a third party skype URIs API which provides us the simple way to initiate the skype call from our application.

Instance	GPU	vCPU	Mem (Gib)	GPU Memory (Gib)	Network Performance	OS	Region	Storage
g3s.xlarge	1	4	30.5	8	up to 10 Gigabit	Ubuntu 19.10	Europe (Ireland)	100 GB

Fig 4: Instance details of the application

After deploying the application we will be having load balancers to avoid traffic of requests. Once the application is logged in by the applicant, the applicant will choose the bank and type of account to be opened for him. The applicant will be redirected to the document upload page where he can upload the required documents to open the bank document. At this stage Amazon Textract is accessed with the help of API to verify the expiry dates of the documents that he has submitted. For example, if the applicant needs to submit previous six-month utility bills then Amazon Textract will check it and give the response to the application. And also, Amazon Sagemaker will be trained in a way to identify the fake documents. This is done by providing both original and fake documents as data sets and train the Sagemaker to identify the fake documents. This will return the response to the application. If any of the two responses is negative then the user will be shown about the error and redirected to the uploading page. Once this process is completed and the document is accepted it creates an appointment for the user. On the day of appointment, the banker will login to the application where they will enter the appointment number and at the same time applicant will also enter the appointment number which will redirect both to the video conferencing page which is done with the help of skype integration. Then in the video conferencing, online form will be shared to the applicant by the banker to fill it out and an e-signature will be got from the applicant. Later user can track their documents like mobile banking pin, ATM card with the help of this application. We will be using a private cloud to store the uploaded documents of the applicants.

9. Key Steps to Build Prototype

Below steps must be followed to build a working prototype:

a) The first step in our project is to create a front-end application for the customers which will be created by the ember.js and backend needs to be created by python with the required libraries and configuration. And the database that should be used is PostgreSQL.

b) After developing the application, deploy the same in the cloud, AWS EC2 g3s.large instance with ubuntu 19.10 OS.

c) While deploying it is mandatory to create the security group and need to configure the inbound and outbound rules as per the application needs.

d) Proceeding further we need to create the AWS Textract and configure such that the Textract identifies the dates to be checked in each document which are submitted.

e) Next step is to train the AWS Sagemaker, build and set the algorithm to learn the fake content in the documents.

f) Now AWS API gateway for the machine learning services i.e. AWS Textract and AWS Sagemaker should be created and the services should be integrated in the application.

g) Configure S3 bucket to keep the logs and backup of the application and the documents uploaded.

h) Important step is to create the IAM role for all the above services to work properly in the developed application.

i) At last, the main scenario of video conferencing, Skype URIs API should be integrated in the application for the Skype video conference.

Our prototype's front-end will be looking like the below figures:

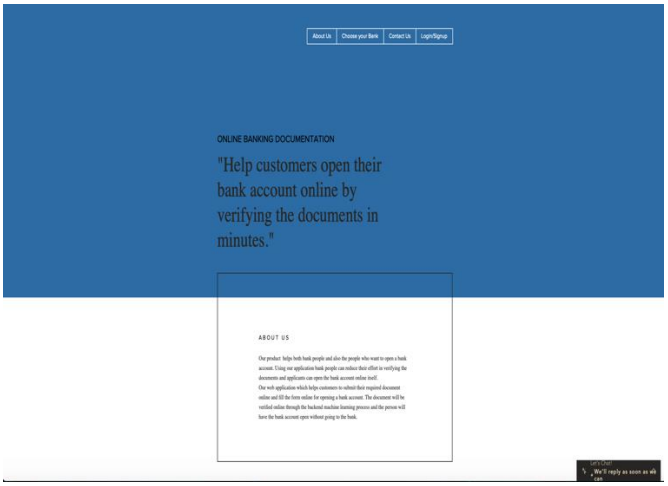

Fig 5: Homepage of the prototype.

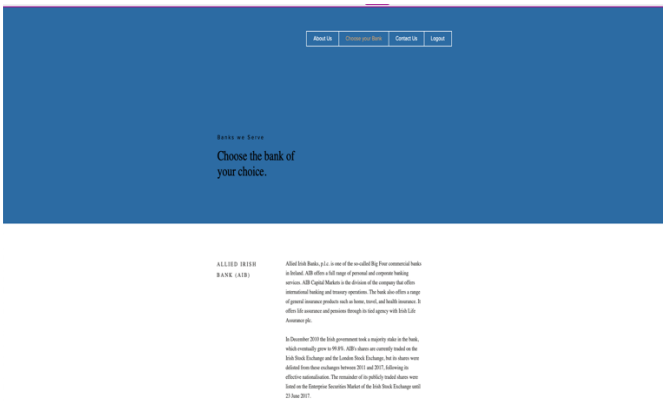

Fig 6: Selecting the bank page

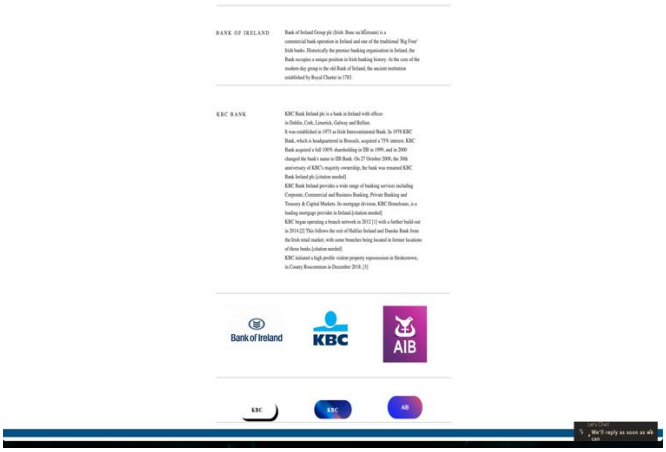

Fig 7: Selecting the bank page (Contd)

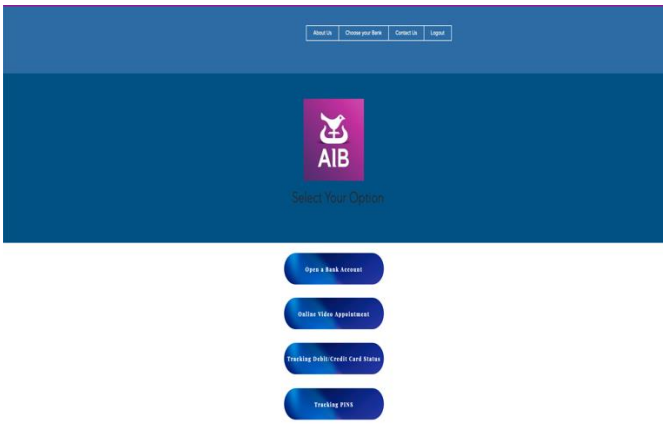

Fig 8: Selecting the Options page (AIB Bank)

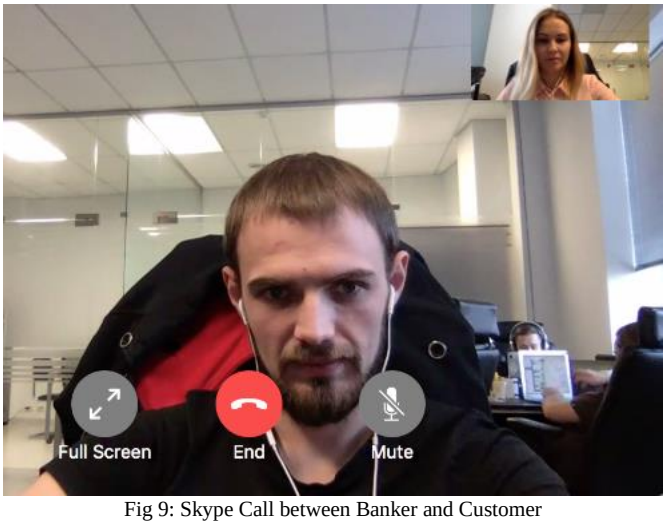

Fig 9: Skype Call between Banker and Customer

Business Model

10. Testing and Validation

Testing and validation are an important factor before selling the product. Our customers should experience the product and it should satisfy them. A live demo should be organised and presented to the customer. In case if we meet the client directly we can ask one of their team members to open the bank account with the help of our product and make other members of the team to view and experience it. When the clients experience the product they can give us the feedback and they will understand how much our product is important for them. In the bank's client side for testing, when a person is opening a bank account we can ask them to open the bank account with our product in front of the banking authority. We can validate our project by the number of new user signups to open a bank account through our application and complete their account opening process. After completion of the process, we can ask the customer to provide feedback and suggestions to improve the process. We can have a document of use case scenarios like below points to make client understand our product.

Before buying the product:

- Customers have to walk all the way to the bank to book an appointment.
- There they have to inform the right timings they can have the appointment and enquire about the documents needed.
- Once the appointment is booked they have to be available on the premises on the appointment day. They will be given a form to fill and the supporting documents will be attached and submitted for approval.
- On the bank side, bankers will take weeks to complete the approval process by verifying the document and background checking.
- Once done the banker will send the necessary things and documents like credit/debit card, ATM PIN, mobile PIN through post.

After buying the product:

- Customers can book an appointment online by uploading the supporting documents.
- If any of the supporting documents has expired in date and if the application finds it fake then it will throw an error and ask the customer to book the appointment again with the supporting documents.
- Once the verification is completed in seconds, an appointment number will be generated for all other future purposes in opening the account.
- On the appointment day, the appointment number can be used for joining the video call with the banker. Once the call has been connected, then users will be asked to fill an online form and put their e-signature in that.
- After this process users can track their documents like credit/debit card, ATM PIN, mobile PIN using the application.

An animated video to explain the step by step process to open an online bank account and about our application can be designed and produced to the client. Ad campaigns can be organised so that we can reach out to the right audience.

Our marketing company that brands our product and takes the product to the customers easily. In our company marketing people will be having both Technical and marketing knowledge, so they will be able to explain how the product will work to the clients. They will be able to explain the unique features in the product and also, they will be able to show a live demo of the developed product.

11. Market Partners

As our project is business to business, our key partners will be banks such as AIB and Bank of Ireland. Banking people will encourage new customers to use our application by putting our application's URL link to their website or advertising on their website. We can also partner with an advertising company which will help us to advertise and bring new business to our company. Below are the few more marketing strategies that can be followed to make our product go into the hands of banks:

- Sending bulk campaigning mails to the people with the help of online tools like mail chimp.
- We can write a blog about our product explaining the uses of it and hosting it online so that whenever the keyword "Online banking" is typed our blog will show up.
- Sponsoring for college events or a bigger fest. For example, if there is a big event to be held, then we can reach out to the organizers and tell them about the sponsorship for the title of their fest. Due to this when they market their fest our product will also be noticed.
- Showcasing our product in "Dublin tech events".
- Letting know the use of our product by participating in the SaaS startup events and giving a speech about our product.

12. Revenue and Resource Model

Our company will recruit three members for development that is for python backend development and database querying, two members for front-end ember.js development, three cloud engineers - one for managing the Devops process and two for managing the cloud infrastructure and two members for supporting the product like functional support. Another 10 people will be recruited for handling other processes like accounting, Business operations (HR) and etc. In Total there will be 20 people working at our company. This is our resource model. Our pricing strategies will be based on a customer login. For example, if a customer logs in and book an appointment to the bank, then that particular bank will be charged a certain amount and that amount will be for the entire account opening process of that customer. As mentioned above if a customer books an appointment then the bank will be charged 20 Euros for the entire account opening for that customer.

Technical Resources	Pricing per month (USD)
AWS - g3s.xlarge instance	540
AWS - Sagemaker	102
AWS - Textract	3
AWS - S3	1150
Private Server	2000
Total Capex per month	3795

Table1: Approx. capex of our company for one month

Unique Value Proposition

The unique value proposition is a one liner that describes the uniqueness of our product. Our product stands in a unique way by making the bank increase the customers by opening the bank account for them online. It also features a unique process like checking the documents for expiry date and also for fake documents using machine learning methods. So the UVP for our product is "Help customers open their bank account online by verifying the documents in minutes." This point covers both technical and business point of view to attract the buyers since there is a unique offering in it.

13. Sum of all Technical and Business Benefits

Bank people will technically get benefited since all the processes are done virtually. The customers will book the appointments online, upload their documents online, open their bank accounts online and track the bank kit online i.e. Credit or Debit cards, ATM PIN etc. Due to this, paperwork for the bankers were avoided and physical presence of customers on bank premises is reduced. Due to the online process, assisting the customer for opening the bank account has been reduced, so that much time is saved and they can serve more number of customers. Moreover, their background verification and document check process are also taken care by the application and the bankers manual work is reduced.

14. Key Differentiating Market Factors

Below are the unique features that differentiates our product from other companies:

- The main difference in our product when compared to other products in the market is, we provide a machine learning way to verify the originality of the documents and a completely online way to open the bank account.
- Our application provides a face-to-face video conference call between the customers and bankers.
- Online tracking system is present to track the bank kit that will be sent to the customer from the bank.

15. Alignment with Customer/User Segment and Requirements

As mentioned in the previous heading our UUR is that people go directly to the bank to open a bank account and bank people take more time to process the application because of background verification and document check. Both these

problems are addressed in our solution and our UVP has satisfied the requirement of the solution in case of both bank and customer.

CONCLUSION

The complete way of developing the prototype for our solution was clearly explained, also the business strategies to make this product even more popular and also the marketing ways to take the product to the customers and consumers were also discussed. To summarize, our product has satisfied the UUR of the problem addressed and our application is unique from other companies in the market, so that all the factors of UVP has been satisfied. Moreover the solution also have the advanced technologies like Machine learning and cloud. If all the above strategies are followed, then this product can also be part of top SaaS products.

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