Lanka Bangla Finance Project

White Owls

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Chapter 1: Introduction

BACKGROUND OF THE ORGANIZATION:

LankaBangla Finance PLC. started its journey long back in 1997 as a joint-venture financial institution with multinational collaboration having license from Bangladesh Bank under Financial Institution Act-1993. Now LankaBangla is the country's leading provider of integrated financial services including corporate financial services, retail financial services, CMSME financial services, stock broking, corporate advisory and wealth management services. Under the broadest umbrella of products and service offerings, they are the only NBFI to operate credit card (Mastercard and VISA).

BACKGROUND OF THE PROJECT:

LankaBangla was established on October 20,1997 in Dhaka Bangladesh. It started its journey as a joint venture between Sri Lankan Finance Company, Commercial Credit and Finance Plc and a local partner. The company primarily focuses on providing a wide range of financial products and services, including lease financing, term loans, corporate and retail banking, SME financing and more. Now coming to the main spotlight, LankaBangla is facing a problem handling sensitive customer information and data security is a top priority. Ensuring the confidentiality, integrity and availability of data is critical and any breach could lead to severe consequences, so LankaBangla needs a better database management scheme to store, retrieve and update data ensuring top quality customer service. Our focus of this project is to establish its database management scheme and make it more scalable to do its daily operations.

OBJECTIVE OF THE PROJECT:

The aim of our project is to design, build and deliver a website that we believe will help clients have better and easier access to making accounts in our company which is LankaBangla Finance. Our company is a full fledged financial portal in Bangladesh that provides live stock market data, account creation and many more. However with the emergence of a digitalized economy where customers are abiding the hassle to travel and getting things done easily. We are creating this website to reduce human effort and let customers take advantage of all our services at the palm of their hands.

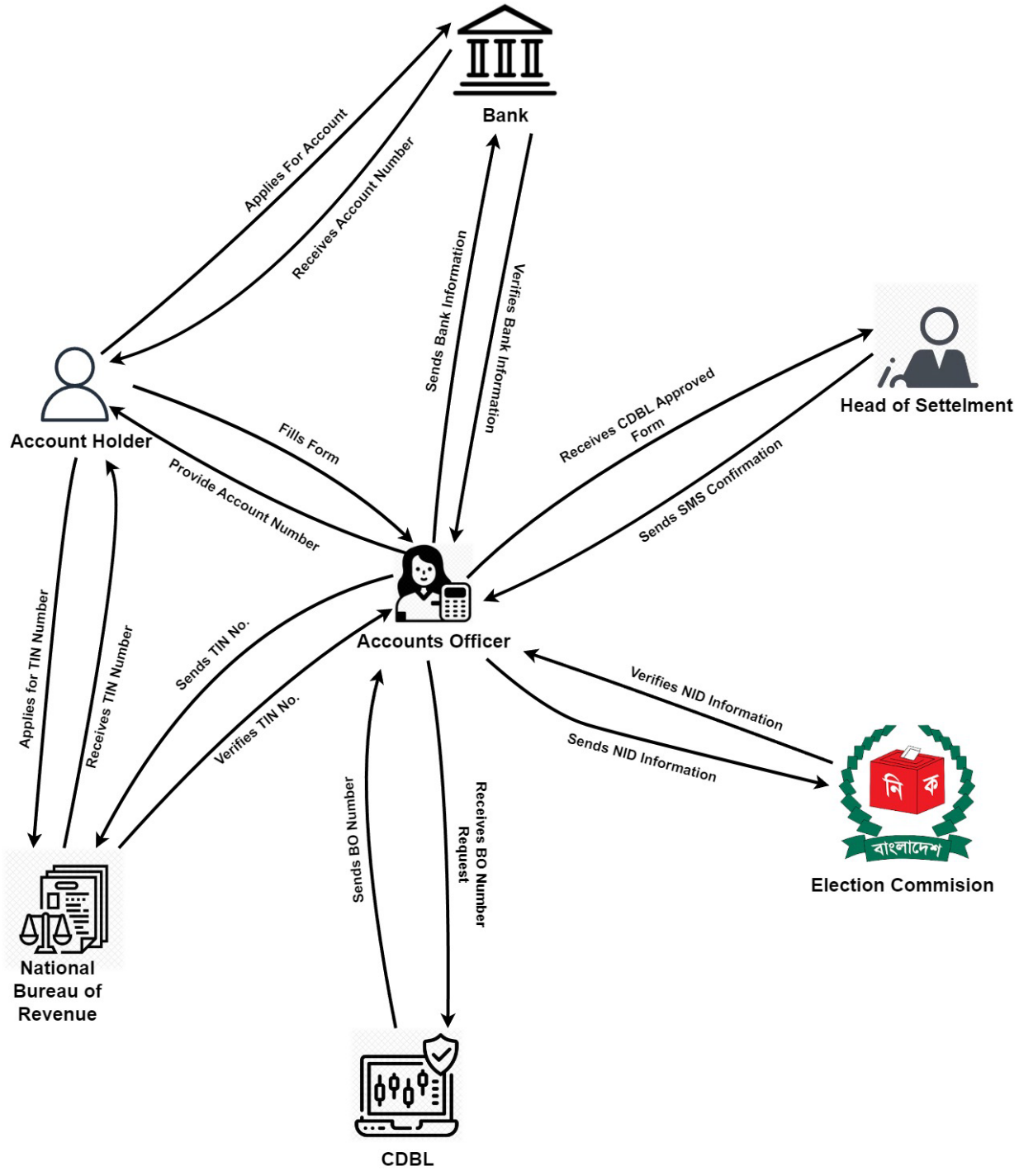
SCOPE OF THE PROJECT:

The scope is to assist in the efficient and effective implementation of the project through the following tasks:

1. Facilitate the implementation, including planning and management.
2. Support for review and improvement of the project implementation.
3. Project Initiation
4. Data Collection
5. Program Analysis
6. Potential Modeling
7. Reporting
8. Project management

CHAPTER 2: REQUIREMENT ANALYSIS

RICH PICTURE AS-IS:



SIX ELEMENTS(AS-IS):

The Six Element Analysis is an important part of the requirement analysis segment to identify the process and the related human including technologies during the procedure. In the analysis segment, we usually find out the key stakeholders, primary and secondary stakeholders as well for a part of humans in a particular process. Then we listed down the non-computing hardware, computing hardware, software, database and network and communication accordingly. Here, the six-element analysis for as-is listed down below:

Process	System Roles					
	Human	Non-Computing Hardware	Computing Hardware	Software	Database	Network & Communication
Creating New Account	i) **Account Holder:** a) Account holder provided the information required for account creation during the time of application. **ii) Accounts officer:** a) application from account holder.	**i) Pen & Paper:** a) Paper is used when the process of filling up forms is carried out.	**N/A**	**N/A**	**i) Physical Files:** a) All the information about the account holders are stored in physical files consisting of paper.	**i) Internet:** a) Used for communication between all the stakeholders of Lanka Bangla via emails. **ii) Phone:** Used for communication between all the stakeholders of Lanka Bangla via phone calls and text messages.
Updating Data	**i)Accounts Officer:** a) Stores the new information b) Updates the data in the Form.	**N/A**	**N/A**	**N/A**	**i) Physical Files:** a) All the information about the account holders are stored in physical files consisting of paper.	**i) Internet:** a) Used for communication between all the stakeholders of Lanka Bangla via emails. **ii) Phone:** Used for communication between all the stakeholders of

						Lanka Bangla via phone calls and text messages.
Verifying Bank Account	**i)Account Holder:** a) Opens a bank account and receives an account number. b) Enters the bank account number in the BO form. **ii)Bank Staff:** a) Helps the Account Holders to open a bank account in the bank b) Receives request for verifying Bank Account Number for BO form and does the verification **iii) Accounts Officer:** a) Sends the request of verification to the bank. b) Receives verification notification from bank. .	**i) Pen and Paper**: Used for recording official records and contracts in the bank.	**i)Computer/ Laptop**: a) Bank Staffs will use computers to store records digitally.	**N/A**	**i) Physical Files:** a) All the information about the account holders are stored in physical files consisting of paper. **i) Bank Database:** a) The bank has its own database for their account holders' data which is used for verification later on.	**i) Internet:** a) Used for communication between all the stakeholders of Lanka Bangla via emails. **ii) Phone:** Used for communication between all the stakeholders of Lanka Bangla via phone calls and text messages.

Verifying TIN Number	**i)Account Holder:** a) Applies to NBR for receiving a TIN number. b) Enters the TIN number in the BO form. **ii)NBR Staff:** a) Receives and accepts applications for acquiring TIN number. b) Receives request for verifying TIN Number for BO form and does the verification **iii) Accounts Officer:** a) Sends the request of verification to NBR. b) Receives the verification notification from NBR.	**i) Pen and Paper**: Used for recording official records and contracts at NBR.	**i)Computer/ Laptop**: a) NBR Staffs will use computers to store records digitally.	**i)NBR Database:** This software is used for managing the database.	**i) Physical Files:** a) All the information about the account holders are stored in physical files consisting of paper. **i) NBR Database:** a) NBR has its own database for their account holders' data which is used for verification later on.	**i) Internet:** a) Used for communication between all the stakeholders of Lanka Bangla via emails . **ii) Phone:** Used for communication between all the stakeholders of Lanka Bangla via phone calls and text messages.
Approving Forms	**i)CDBL:** a) Receives request for providing BO Number. b) Sends BO Number **ii)Head Of Settlement:** a) Receives the form that is approved by CDBL.	**i) Pen and Paper**: Used for keeping records of the BO numbers in a physical copy.	**i)Computer/ Laptop**: a) CDBL Staffs will use computers to store records digitally.	**N/A**	**i) Physical Files:** a) All the information about the account holders are stored in physical files consisting of paper.	**i) Internet:** a) Used for communication between all the stakeholders of Lanka Bangla via emails. **ii) Phone:** Used for communication between all the stakeholders of Lanka Bangla via

	b) Approves the form after checking and sends confirmation via SMS. **iii) Accounts Officer:** a) Receives information about account holders through forms filled by Account Holders. b) Approves forms after verifying Information.					phone calls and text messages.
Verifying NID Number	**i) Accounts Officer:** a) Sends the request of verification to the Election Commission . . b) Receives verification notification from Election Commision. **ii)Election Commission Staff:** a) Receives and accepts applications for acquiring NID number .	**i) Pen and Paper**: Used for recording official records and contracts at the Election Commission.	**i)Computer/ Laptop**: a) Election Commission Staffs will use computers to store records digitally which is used for checking the NID database.	**i)Election Commission Technology:** This software is used for managing the database.	**i)Election Commission Database:** Used for storing and checking NID holders' data.	**i) Internet:** a) Used for accessing the database and modifying it. b) Used for sending and receiving verification requests and confirmations.

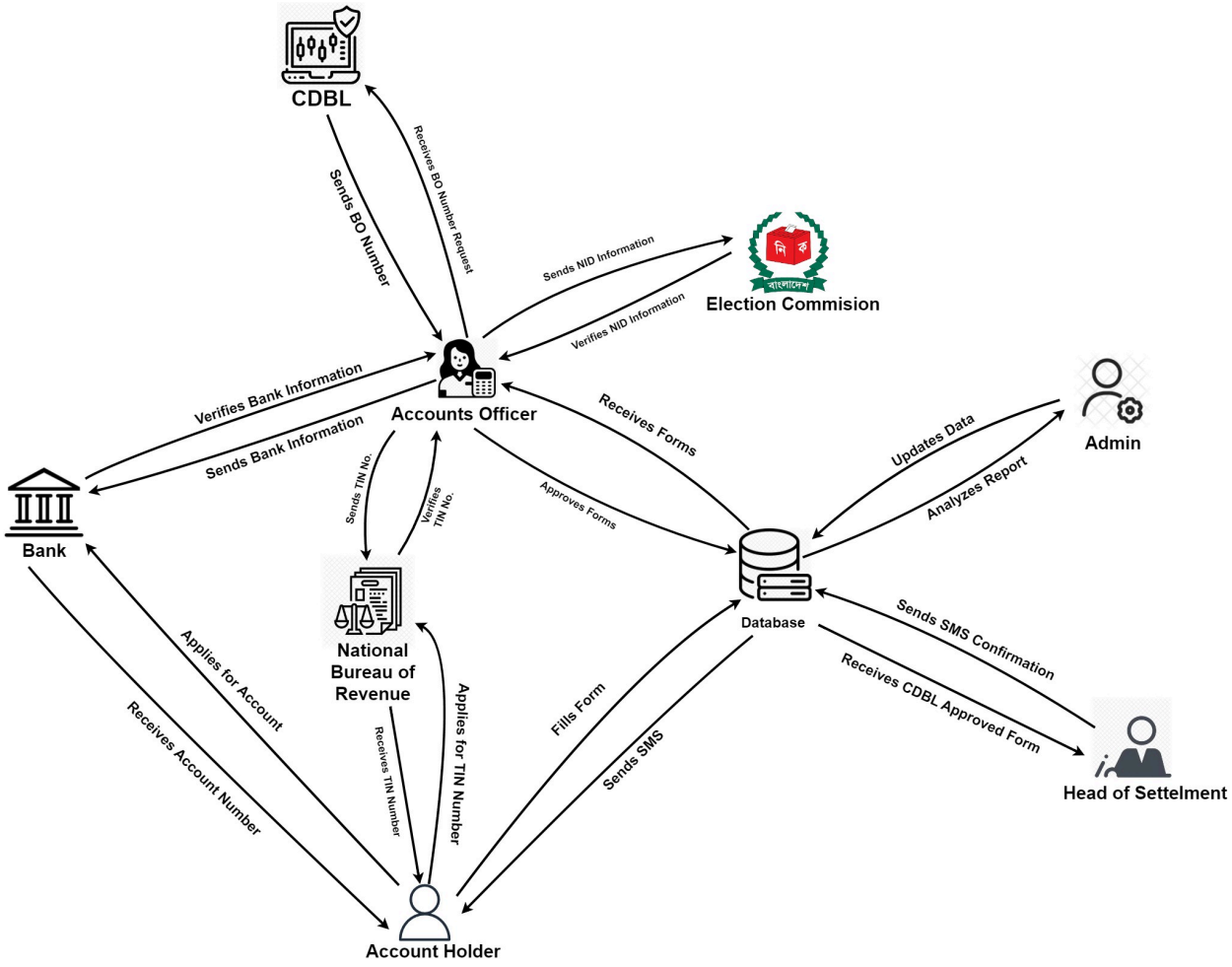
	b) Receives request for verifying NID Number for BO form and does the verification					

PROBLEM ANALYSIS:

Process Name	Stakeholders	Concerns (Problems)	Analysis (Reason of the Problem)	Proposed Solution
Basic Data Entry	1. Account Holder 2. Accounts Officer	1. Account Holders are having a hard time gathering the physical forms and filling them up and submitting them back to the Accounts Officer.	The existence of this problem roots from the lack of use of technology. Everything is done by pen and paper which is making it very difficult for the accounts officer to Verify and Validate the data that is being filled by the Account Holder.	Our Proposed Solution to this is by making a web app that uses a relational database in which the account holder can directly input the data in an online form from the ease of his home without having the need of collecting any form in the first place. This online form will also automatically validate the data.
Approving and verifying Data	1. Account Holder 2.Head of Settlement	1. The head of settlement is required to Approve very large amounts of data and it is becoming increasingly difficult.	The existing system has no database in use. Therefore, if the admin wants to approve a form, he has to physically find the account holder submitted form and then approve it. This is a very long and tedious process, and it only gets more difficult with the increasing number of clients.	Our proposed solution to this problem is that we implement a database on our LankaBangla web app. The Head of settlement will be able to view and search for the Account holder's form digitally and approve it digitally. This will save a lot of time for the head of settlement.

Validation and Update Data	1. Account Holder 2. Accounts Officer 3. Head of Settlement	1. If the Account holder needs to update his data in his form, he needs to restart his application all over again. 2. If the Account Officer needs to validate data and can only do so after the Account Holder has already filled the form once. This means that any error found during validation means that the Account holder has to rewrite and resubmit the form.	The Problem stems from being the only situation if technology is not used. As technology is not being used the account holder is being forced to rewrite the form every time a mistake is made or an update needs to be made.	Our solution to this is to have data validation functions in the online form of our web app. This will ensure that the Account holder cannot enter data that is not accepted. There will also be an update data tab for the Account holder that makes sure that the Account holder can update his data quickly and effortlessly.
Report Generation	1. Head of Settlement 2. Accounts Officer	There are no statistics reports of the Account holder for the Head of settlement to view.	The reason this problem exists is because Lanka Bangla Finances have a large number of clients and count specific attributes and creating a report based on these would take a very long time to complete. The reason it would take a long time to coin these attributes is because someone would need to go through each form individually page by page.	Our Solution to this problem is to have an admin user in our Web App. This admin user will have access to the dashboard and will be able to automatically generate a report with the push of a button. The application will be able to fetch large and specific amounts of data from the database using MySQL.

RICH PICTURE TO-BE:



SIX ELEMENTS TO-BE:

The Six Element Analysis is an important part of the requirement analysis segment to identify the process and the related human including technologies during the procedure. In the analysis segment, we usually find out the key stakeholders, primary and secondary stakeholders as well for a part of humans in a particular process. Then we listed down the non-computing hardware, computing hardware, software, database and network and communication accordingly. Here, the six-element analysis for to- be listed down below:

Process	System Roles					
	Human	Non-Computing Hardware	Computing Hardware	Software	Database	Network & Communication
Creating New Account	i)**Account Holder:** a) Account provided the information required for account creation during the time of application. **ii) Accounts officer:** a) Pulls forms from the database to verify everything from the forms. b) Carries out the approval process.	**i)Paper:** a) Paper is used when a Account holder applies for the process	**i)Computer/ Laptop**: a) Computer is used during the application process	**i)Lanka Bangla Web Application:** a) It is an interface which stores data and is used by the users for the entries of the information of the account holders into the database	**i) Excel/ Spreadsheet**: It is used for storing the information of the Account holder in the database	**i) Internet:** a) Used for accessing the database and update information.

Updating Data	**i)Admin:** a) Pulls Data from the database b) Updates the data in the database.	N/A	**i)Computer/ Laptop**: a)Computer is used during the update process.	**i)Lanka Bangla Web Application :** This software is used for managing the database.	**i) Excel/ Spreadsheets :** Used for storing account data. **ii)SQL Database:** Used for storing users' data	**i) Internet:** a) Used for accessing the database and modifying it.
Verifying Bank Account	**i)Account Holder:** a) Opens a bank account and receives an account number. b) Enters the bank account number in the BO form. **ii)Bank Staff:** a) Helps the Account Holders to open a bank account in the bank b) Receives request for verifying Bank Account Number for BO form and does the verification **iii) Accounts Officer:**	**i) Pen and Paper**: Used for recording official records and contracts in the bank.	**i)Computer/ Laptop**: a) Bank Staffs will use computers to store records digitally. b) Accounts officer use computers/ laptops for carrying out the verification process.	**i)Lanka Bangla Web Application :** This software is used for managing the database.	**i) Excel/ Spreadsheets :** Used for storing account data. **ii)Bank Database:** Used for storing users' data	**i) Internet:** a) Used for accessing the database and modifying it. b) Used for sending and receiving verification requests and confirmations.

	a) Sends the request of verification to the bank. b) Receives verification notification from bank. .					
Verifying TIN Number	**i)Account Holder:** a) Applies to NBR for receiving a TIN number. b) Enters the TIN number in the BO form. **ii)NBR Staff:** a) Receives and accepts applications for acquiring TIN number. b) Receives request for verifying TIN Number for BO form and does the verification **iii) Accounts Officer:** a) Sends the request of verification to NBR. b) Receives the verification notification from NBR.	**i) Pen and Paper**: Used for recording official records and contracts at NBR.	**i)Computer/ Laptop**: a) NBR Staffs will use computers to store records digitally. b) Accounts officer use computers/ laptops for carrying out the verification process	**i)Lanka Bangla Web Application :** This software is used for managing the database.	**i) Excel/ Spreadsheets :** Used for storing account data. **ii)NBR Database:** Used for storing users' data	**i) Internet:** a) Used for accessing the database and modifying it. b) Used for sending and receiving verification requests and confirmations.

Approving Forms	**i)CDBL:** a) Receives request for providing BO Number. b) Sends BO Number **ii)Head Of Settlement:** a) Receives the form that is approved by CDBL. b) Approves the form after checking and sends confirmation via SMS. **iii) Accounts Officer:** a) Receives information about account holders through forms filled by Account Holders stored in the database. b) Approves forms after verifying Information.	**i) Pen and Paper**: Used for keeping records of the BO numbers in a physical copy.	**i)Computer/ Laptop**: a) CDBL Staffs will use computers to store records digitally. b) Accounts officer use computers/ laptops for carrying out the approval process.	**i)Lanka Bangla Web Application:** This software is used for managing the database.	**i) Excel/ Spreadsheets:** Used for storing account data. **ii)SQL Database:** Used for storing users' data including BO Number.	**i) Internet:** a) Used for accessing the database and modifying it. b) Used for sending and receiving verification requests and confirmations.
Verifying NID Number	**i) Accounts Officer:** a) Sends the request of verification to the Election Commission. .	**i) Pen and Paper**: Used for recording official records and contracts at the Election Commission.	**i)Computer/ Laptop**: a) Election Commission Staffs will use computers to store records digitally. b) Accounts officer use computers/	**i)Election Commission Web Application:** This software is used for managing the database.	**i) Excel/ Spreadsheets:** Used for storing account data. **ii)Election Commission Database:**	**i) Internet:** a) Used for accessing the database and modifying it. b) Used for sending and receiving verification requests and confirmations.

	b) Receives verification notification from Election Commission . **ii)Election Commission Staff:** a) Receives and accepts applications for acquiring NID number . b) Receives request for verifying NID Number for BO form and does the verification		laptops for carrying out the verification process		Used for storing users' data	

CHAPTER 3: LOGICAL SYSTEM DESIGN

Business Rules

The center of our system design is our client. The client is identified with the client account number. The attributes that are stored in the client are code, title, name, father_name, mother_name, spouse_name, country, permenent_city, present_post, branch, phone number, bank_account_number, bank_name, routing_number and his BO number. The BO number is used to store information about his BO account.

The BO account entity in our database can be identified by the BO number. This will hold phone_number, email, nid, occupation, dob, nationality, photo, sign, type, account_type, client_signature, operation_type (first_account?, Joint_account?, Corporate?). There are three types of BO accounts: First Account, Joint Account, and Corporate. Each Corporate BO account will have a company and that company will identify an Authorized person and contain auth_title, auth_father_name, auth_mother_name, auth_spouse_name, auth_address, auth_country, auth_number, auth_email, auth_nid, auth_dob, auth_occupation, auth_nationality, auth_photo, auth_sign. Similarly First Accounts types will contain first_number, first_email, first_nid, first_dob, first_occupation, first_nationality, first_photo, first_sign and the Joint Account types will contain joint_title, joint_father_name, joint_mother_name, joint_spouse_name, joint_address, joint_country, joint_number, joint_email, joint_nid, joint_dob, joint_occupation, joint_nationality, joint_photo, joint_sign.

A BO Account May have multiple nominees. A nominee is identified by his given nominee ID and nom_title, nom_name, nom_address, nom_mobile, nom_email, nom_city, nom_state, nom_post_code, nom_country_code, nom_nid, nom_gender, nom_dob, nom_photo, nom_signature, Percentage, Relationship, Nominee_type is stored as well. There are two types of nominees: Minor and Adult. If the nominee is a minor, minor_guardian first name, minor_guardian last name , minor_ guardian relationship, minor_ dob, minor_ maturity_date, guardian_ address(g_city, g_post_code, g_state, g_country), guardian_telephone, guardian_ phone_phone, guardian_fax, guardian_email, guardian_passport, guardian_pass_issue_place, guardian_pass_issue_date, guardian_pass_expiry_date, guardian_residency, guardian_nationality, guardian_dob, guardian_photo, guardian_signature is also stored.

The BO Account also may have an Attorney. CDBL_account_number, Name_of_account_holder, Name_of_attorney, attorney_address, attorney_mobile, attorney_passport_number, attorney_residency, attorney_nationality, attorney_dob, and Effective_date is recorded in the Power of Attorney entity.

The BO Account also may have a KYC profile. Over here Account_name, Type_of_account, Introducer_name, source_of_fund, passport_no, T.I.N_number, Var_reg_no, Driving_license_no, signature will be stored.

Every client is also assigned a relationship manager. The relationship manager is identified by his RM ID. number, email, nid, occupation, dob, nationality, photo, sign is also stored.

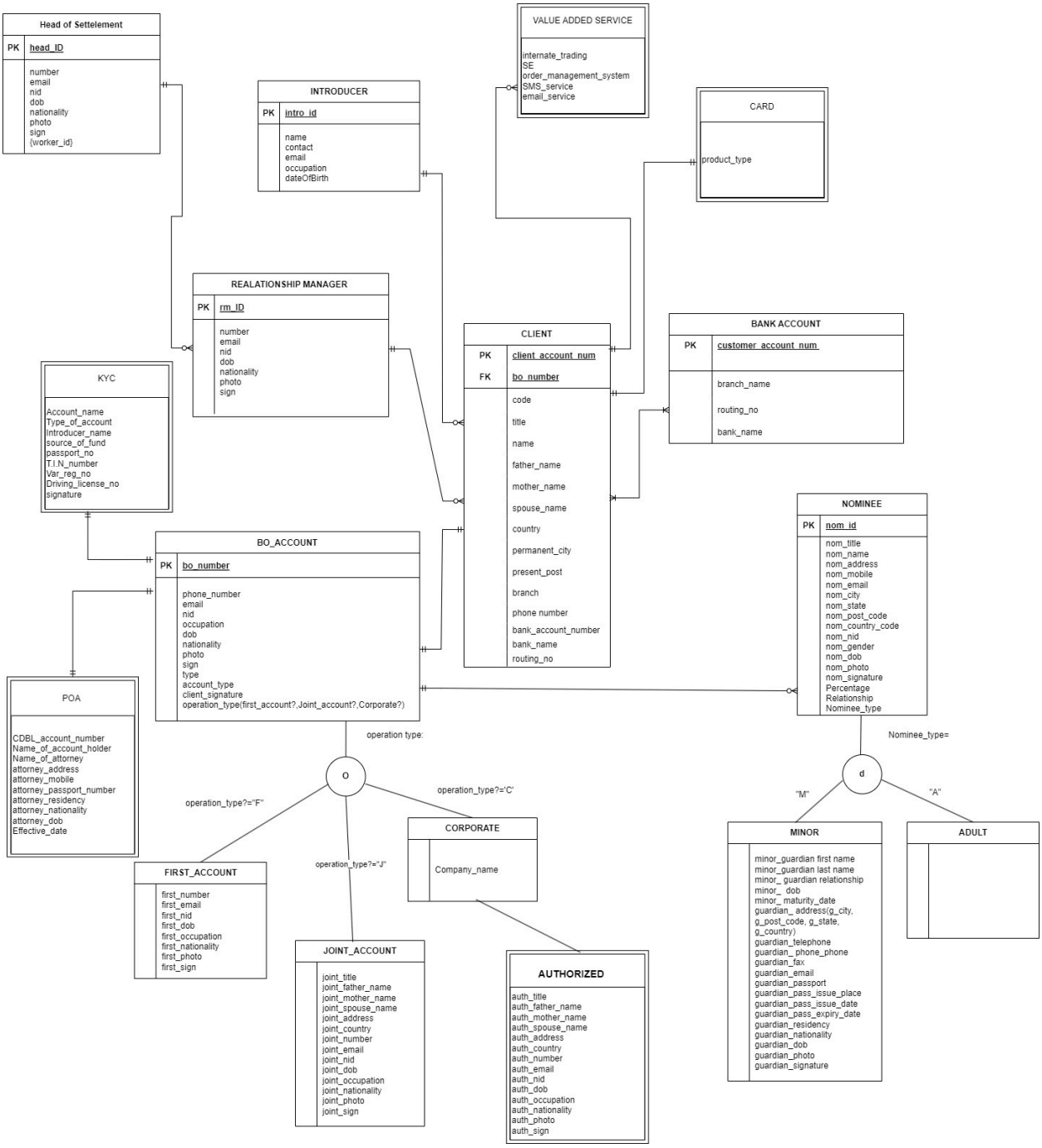
Heads of settlements are the stakeholders that overlook the relationship managers. They are Identified by the Head ID. Their number, email, nid, occupation, dob, nationality, photo, sign is also stored here.

Every client must have a bank account or many bank account. Bank accounts are identified with their customer Account Numbers. Branch Names, routing numbers, and Bank Name of the bank account are also stored.

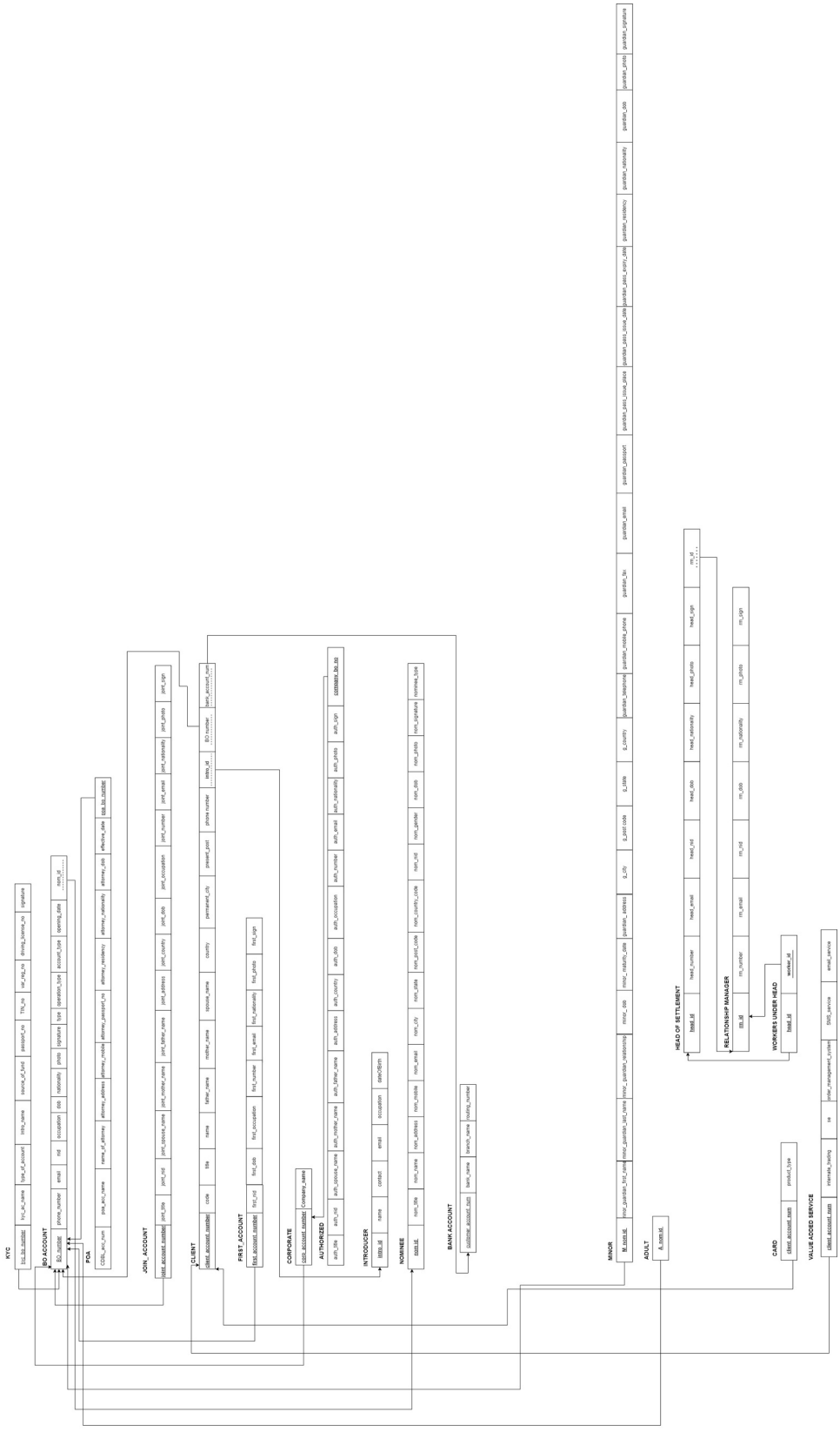
Every client has a value-added service profile where all their value-added services information; internate_trading, SE, order_management_system, SMS_service, email_service are recorded.

Every client is also assigned a card and all their card details such as product type are also stored.

ENTITY RELATIONSHIP DIAGRAM:



ENTITY RELATIONSHIP DIAGRAM TO RELATIONAL SCHEMA:



Normalization

Dependencies for the Normalization:

To start the normalization, we are going to assign keys to the attribute names taken from the schema first:

account_number(c1)-> code(c2), title(c3), name(c4), father_name(c5), mother_name(c6), spouse_name(c7), present_post(c8), permanent_city(c9), country(c10), number(c11), bank_account_number(b1), BO_number(o1), intro_id(i1)

BO_number(o1)-> phone_number(o2), email(o3), nid(o4), occupation(o5), dob(o6), nationality(o7), photo(o8), signature(o9), type(o10), operation_type(o11), account_type(o12), opening_date(o13), nom_id(n1)

bank_account_num(b1)-> bank_name(b2), branch_name(b3), routing_number(b4)

first_account_number(o1)-> first_nid(f1), first_dob(f2), first_occupation(f3), first_number(f4), first_email(f5), first_nationality(f6), first_photo(f7), first_sign(f8)

joint_acount_number(o1)-> joint_title(j1), joint_nid(j2), joint_spouse_name(j3), joint_mother_name(j4), joint_father_name(j5), joint_address(j6), joint_country(j7), joint_dob(j8), joint_occupation_number(j9), joint_email(j10), joint_nationality(j11), joint_photo(j12), joint_sign(j13)

corp_account_number(o1)-> company_name(co1)

company_bo_no(o1)-> auth_title(a1), auth_nid(a2), auth_spouse_name(a3), auth_mother_name(a4), auth_father_name(a5), auth_address(a6), auth_country(a7), auth_dob(a8), auth_occupation_number(a9), auth_email(a10), auth_nationality(a11), auth_photo(a12), auth_sign(a13)

intro_id(i1)-> name(i2), contact(i3), email(i4), occupation(i5), dateOfBirth(i6)

nom_id(o1)-> nom_title(n1), nom_name(n2), nom_address(n3), nom_mobile(n4), nom_email(n5), nom_state(n6), nom_post_code(n7), nom_country_code(n8),

nom_nid(n9), nom_gender(n10), nom_dob(n11), nom_photo(n12), nom_signature(n13), nominee_type(n14)

minor_id(n1)-> minor_guardian_full_name(m1), minor_guardian_last_name(m2), minor_guardian_relationship(m3), minor_dob(m4), minor_maturity_date(m5), guardian_address(m6), g_city(m7), g_post_code(m8), g_state(m9), g_country(m10), guardian_telephone(m11), guardian_mobile_Phone(m12), guardian_fax(m13), guardian_email(m14), guardian_passport(m15), guardian_pass_issue_place(m16), guardian_pass_issue_date(m17), guardian_pass_expiry_date(m18), guardian_residency(m19), guardian_nationality(m20), guardian_dob(m21), guardian_photo(m22), guardian_signature(m23)

client_account_number(c1)-> product_type(cd1)

client_account_number(c1)-> internet_trading(v1), SE(v2), order_management_system(v3), SMS_service(v4), email_service(v5)

head_id(h1)-> head_number(h2), head_email(h3), head_nid(h4), head_dob(h5), head_nationality(h6), head_photo(h7), head_sign(h8), worker, rm_id(r1)

rm_id(r1)-> rm_number(r2), rm_email(r3), rm_nid(r4), rm_dob(r5), rm_nationality(r6), rm_photo(r7), rm_sign(r8),

kyc_BO_number(o1)-> kyc_ac_name(k1), type_of_account(k2), intro_name(k3), source_of_fund(k4), passport_no(k5), TIN_no(k6), var_reg_no(k7), driving_license_no(k8), signature(k9)

poa_bo_number(o1)-> CDBL_acc_num(p1), poa_acc_name(p2), name_of_attorney(p3), attorney_address(p4), attorney_mobile(p5), attorney_passport_no(p6), attorney_residency(p7), attorney_nationality(p8), attorney_dob(p9), efective_date(p10)

Dependencies for the Normalization(Only Using Alphabets):

c1-> c2, c3, c4, c5, c6, c7, c8, c9,c10, c11,o1, i1, b1, cd1, v1, v2, v3, v4, v5

o1-> o2, o3, o4, o5, o6, o7, o8, o9, o10, o11, o12, o13, a1, a2, a3, a4, a5, a6, a7, a8, a9, a10, a11, a12, a13, co1, k1, k2, k3, k4, k5, k6, k7, k8, k9, p1, p2, p3, p4, p5, p6, p7, p8, p9, p10, n1, f1, f2, f3, f4, f5, f6, f7, f8, j1, j2, j3, j4, j5, j6, j7, j8, j9, j10, j11, j12, j13

b1-> b2, b3, b4

i1-> i2, i3, i4, i5, i6

n1-> n2, n3, n4, n5, ln6, n7, n8, n9, n10, n11, n12, n13, n14, m1, m2, m3, m4, m5, m6, m7, m8, m9, m10, m11, m12, m13, m14, m15, m16,m17, m18, m19, m20, m21, m22, m23

r1-> r2, r3, r4, r5, r6, r7, r8

h1-> h2, h3, h4, h5, h6, h7, h8, r1

Normalization until BCNF:

1NF:

T1

c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11	**o1**	**i1**	**b1**	b2	b3	o2	o3	o4	o5
o6	o7	o8	o9	o10	o11	012	o13	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12
a13	co1	k1	k2	k3	k4	k5	k6	k7	k8	k9	p1	p2	p3	p4	p5	p6	p7	p8	p9
p10	f1	f2	f3	f4	f5	f6	f7	f8	j1	j2	j3	j4	j5	j6	j7	j8	j9	j10	j11
j12	j13	i2	i3	i4	i5	i6													

T2

n1	n2	n3	n4	n5	n6	n7	n8	n9	n10	n11	n12	n13	n14	m1	m2	m3	m4	m5	m6
m7	m8	m9	m10	m11	m12	m13	m14	m15	m16	m17	m18	m19	m20	m21	m22	m23			

T3

r1	r2	r3	r4	r5	r6	r7	r8

T4

h1	h2	h3	h4	h5	h6	h7	h8

2NF:

Since there are no partial dependencies, the tables are already in 2NF form.

3NF:

T111

c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11	o1	i1	b1

T112

o1	o2	o3	o4	o5	o6	o7	o8	o9	o10	o11	o12	o13	a1	a2	a3	a4	a5	a6	a7
a8	a9	a10	a11	a12	a13	co1	k1	k2	k3	k4	k5	k6	k7	k8	k9	p1	p2	p3	p4
p5	p6	p7	p8	p9	p10	f1	f2	f3	f4	f5	f6	f7	f8	j1	j2	j3	j4	j5	j6
j7	j8	j9	j10	j11	j12	j13													

T113

i1	i2	i3	i4	i5	i6

T141

b1	b2	b3	b4

T2

n1	n2	n3	n4	n5	n6	n7	n8	n9	n10	n11	n12	n13	n14	m1	m2	m3	m4	m5	m6
m7	m8	m9	m10	m11	m12	m13	m14	m15	m16	m17	m18	m19	m20	m21	m22	m23			

T3

r1	r2	r3	r4	r5	r6	r7	r8

T4

h1	h2	h3	h4	h5	h6	h7	h8

BCNF

All the tables are already in BCNF form.

Data Dictionary

adult

Name	Datatype	Size	Remarks
adult_bo_num	VARCHAR	8	This is the primary key of this relationship. This contains the BO number of the adult. Example: “78945612”

Authorized person

Name	Datatype	Size	Remarks
account_number	VARCHAR	8	This is a foreign key of this relation that is referred to as corp_account_num. Example: “12345678”
title	VARCHAR	3	This attribute contains the title of Authorized person. Example: “Mr.”
name	VARCHAR	30	This attribute contains the name of Authorized person. Example: “Asif Bin Saif”
spouse_name	VARCHAR	30	This attribute contains the spouse name of Authorized person. Example: “Begum Khaleda”
mother_name	VARCHAR	30	This attribute contains the mother name of the Authorized person. Example: “Theresa May”
father_name	VARCHAR	30	This attribute contains the father name of Authorized person. Example: “Zia Hossain”
nid	VARCHAR	10	This attribute contains the nid of the Authorized person. Example: “1234567893”
address	VARCHAR	70	This attribute contains the address of the Authorized Person. Example: “127 Dhanmondi, Rd 9/A”
country	VARCHAR	20	This attribute contains the country of the Authorized Person. Example: “India”

dateofbirth	DATE		This attribute contains the date of birth of the Authorized Person. Example: “1999-02-02”
occupation	VARCHAR	20	This attribute contains the occupation of the Authorized Person. Example: “Serial Killer”
phone_number	VARCHAR	11	This attribute contains the phone number of the Authorized Person. Example: “01669966996”
email	VARCHAR	20	This attribute contains the email of the Authorized Person. Example: “dbms@gmail.com”
nationality	VARCHAR	30	This attribute contains the nationality of the Authorized Person. Example: “Indian”
photo	VARCHAR	16	This attribute contains the memory address of the image of the photo of the Authorized Person.
signature	VARCHAR	16	This attribute contains the memory address of the image of the signature of the Authorized Person.

Bank

Name	Datatype	Size	Remarks
account	VARCHAR	10	This is the primary key of this relationship. This contains the account number of the bank. Example: “1234567890”
bank_name	VARCHAR	40	This attribute contains the name of the bank of the client. Example: “NBL”
branch_name	VARCHAR	45	This attribute contains the branch name of the bank specific to the client. Example: “NBL-Dhanmondi”
routing_number	VARCHAR	9	This attribute contains the routing number of the client specific to the branch. Example: “132465798”

BO account

Name	Datatype	Size	Remarks
bo_number	VARCHAR	16	This is the primary key of this relationship. This contains the BO number of the BO Account. Example: “1234567891234567”

email	VARCHAR	30	This attribute contains the email of the client. Example: “dbms@toogle.com”
bo_nid	VARCHAR	10	This attribute contains the NID of the client required for making a BO account. Example: “1472583691”
occupation	VARCHAR	20	This attribute contains the details of the occupation of the client. Example: “Jobless”
DOB	DATE		This attribute contains the date of birth of the client. Example: “2000-02-03”
nationality	VARCHAR	20	This attribute contains the nationality of the client. Example: “Indian”
photo	VARCHAR	16	The datatype is used to store the memory address of the image of his/her that the client submits.
signature	VARCHAR	16	The datatype is used to store the memory address of the image of his/her signature that the client submits.
account_type	VARCHAR	2	This attribute contains the account type of BO account.
operation_type	VARCHAR	1	This attribute contains the operation type of BO account. Example: “F”/”J”/”C”
opening_date	DATE		This attribute contains the opening date of the BO account. Example: “1998-11-04”
nom_id	VARCHAR	8	This is a foreign key of this relation that is referred to as account_number.
phone_number	VARCHAR	11	This is the phone number associated with every BO Account. Example: “01645326489”

card

Name	Datatype	Size	Remarks
account_number	VARCHAR	10	This is the primary key of this relationship.
product_type	VARCHAR	25	

Client

Name	Datatype	Size	Remarks
account_number	VARCHAR	10	This is the primary key of this relationship.
client_code	VARCHAR	15	This specifies the given client code to each client. Example: “123764867465936”
title	VARCHAR	3	Signifies the title of the client. Example: “MR”/”MS”
client_name	VARCHAR	30	This is the name of the client Example: “John Drury”
father_name	VARCHAR	30	This is the client’s father’s name Example: “Peter Griffin”
mother_name	VARCHAR	30	This is the client’s Mother’s Name. Example: “Lois Lane”
spouse_name	VARCHAR	30	This is the client’s spouse’s name. Example: “Talia Botez”
country	VARCHAR	45	Signifies the client’s country Example: “Bangladesh”
permanent_city	VARCHAR	30	Details the permanent address of the client. Example: “Dhaka”
permanent_post	VARCHAR	5	Details the permanent postal Code of the client. Example: “1212”
branch	VARCHAR	30	Details the LankaBangla branch where the client is applying for an account. Example: “Agrabad”
phone_number	VARCHAR	11	Stores the Client’s Phone Number to be associated with the account.

			Example: 01707174570
operation	VARCHAR	45	
intro_id	VARCHAR	8	This is a foreign key of this relation with the Introducer
bo_account_number	VARCHAR	16	This is a foreign key of this relation with the Client's BO Account
bank_account_number	VARCHAR	20	This is a foreign key of the relation with the Client's Bank Account Number.

corporate

Name	Datatype	Size	Remarks
corp_account_num	VARCHAR	8	This is a foreign key of this relation with BO number of the BO ACCOUNT table
company_name	VARCHAR	30	Is the name of the company. Example:"Independent"

first_account

Name	Datatype	Size	Remarks
first_account_number	VARCHAR	8	This is the primary key of this table, identifying the client. Example:"1001149"
nid	VARCHAR	10	This is the NID of the client if he/she chooses to operate as a first account
dateOfbirth	DATE		Details the client's date of Birth in YYYY-MM-DD format, Example: "1990-03-12"
occupation	VARCHAR	20	Details the client's occupation Example: "Student"
phone_number	VARCHAR	11	Is the client's unique phone number associated with his/her BO account Example: "0170527482"

email	VARCHAR	40	Is the client's unique email associated with his/her BO account. Example: "john@gmail.com"
nationality	VARCHAR	30	Is the Client's nationality Example: "Bangladeshi"
photo	VARCHAR	16	Stores the 16 character memory address of the image of the client on the server that the client sends.
signature	VARCHAR	16	Stores the 16 character memory address of the image of the client on the server that the client sends.

head_of_settlement

Name	Datatype	Size	Remarks
employee_id	VARCHAR	10	This is the primary key of this relationship. Example: "1234567894"
phone_number	VARCHAR	11	This is the elven digit phone number of the head of settlement Example: "01713017079"
nid	VARCHAR	10	Is the NID 10 digit number of the head of settlement Example: "12345673894"
dob	DATE		Is the date of birth of the head of settlement in YYYY-MM-DD format. Example: "1998-11-04"
email	VARCHAR	40	Is the unique email of the head of settlement Example: "lois@gmail.com"
nationality	VARCHAR	20	Is the head of settlement's nationality Example: "Bangladeshi"

photo	VARCHAR	16	Stores the 16 digit memory address of the photo of the head of settlement on the server.
signature	VARCHAR	16	Stores the 16 digit memory address of the photo of the signature head of settlement on the server.
rm_id	VARCHAR	10	This attribute is a foreign key which stores the id of the Relationship Manager

introducer

Name	Datatype	Size	Remarks
Introducer_id	VARCHAR	8	This is the primary key of this relationship. Example: “19475638”
name	VARCHAR	40	Is the name of the introducer. Example: “Dick Grayson”
phone_number	VARCHAR	11	Is the introducer’s unique 11 digit phone number Example: “01713857894”
email	VARCHAR	40	Is the introducer’s unique email address. Example: “john@gmail.com”
occupation	VARCHAR	20	This attribute stores the occupation of the introducer. Example: “Robber”
dob	VARCHAR	25	Is the introducer’s date of birth in YYYY-MM-DD format. Example: “1998-11-04”

joint_account

Name	Datatype	Size	Remarks
joint_account_number	VARCHAR	8	This is the primary key of this relationship. This contains the joint account number of the joint account. Example: “78945612”

title	VARCHAR	2	This attribute contains the title of the joint account. Example: “Mr.”
spouse_name	VARCHAR	30	This attribute contains the spouse’s name of the joint account. Example: “Zia Khanam”
mother_name	VARCHAR	30	This attribute contains the mother’s name of the joint account. Example: “Zia Begum”
father_name	VARCHAR	30	This attribute contains the father’s name of the joint account. Example: “Zia Hasan”
permanent_address	VARCHAR	70	This attribute contains the permanent address of the joint account. Example: “127 Dhanmondi, Road 9/A”
country	VARCHAR	30	This attribute contains the country of the joint account. Example: “India”
dob	DATE		This attribute contains the date of birth of the joint account. Example: “1999-02-02”
occupation	VARCHAR	20	This attribute contains the occupation of the joint account. Example: “dbms@gmail.com”
phone_number	VARCHAR	11	This attribute contains the phone number of the joint account. Example: “01669696969”
email	VARCHAR	50	This attribute contains the email of the joint account. Example: “dbms@gmail.com”
nationality	VARCHAR	30	This attribute contains the nationality of the joint account. Example: “Indian”
photo	VARCHAR	16	This attribute contains the photo of the joint account.
signature	VARCHAR	16	This attribute contains the signature of the joint account.
nid	VARCHAR	10	This is the NID number of every joint Account holder. Example: “1648263549”

KYC

Name	Datatype	Size	Remarks
bo_account_num	VARCHAR	16	This is the primary key of this relationship. Example: “12736457890374657”
account_name	VARCHAR	30	Is the client’s name for which this KYC form is made Example: “Homer Simpson”
type_of_account	VARCHAR	2	
intro_name	VARCHAR	30	Is the name of the introducer for the KYC form Example: “Michael Jackson”
source_of_fund	VARCHAR	120	This attribute stores the description of the source of funds for the kyc form.
passport_num	VARCHAR	18	Is the passport number of the client for the associated KYC form. Example: “BL006904‘
tin_num	VARCHAR	12	Is the Unique TIN number of the client for the KYC form. Example: “123456789027”
var_reg_no	VARCHAR	45	
driving_license_no	VARCHAR	15	Is the unique driving license number of the client Example: “126475890374625”
signature	VARCHAR	16	Stores the memory address of the photo of the signature of the client on the server.

Minor

Name	Datatype	Size	Remarks
minor_id	VARCHAR	8	This is the primary key of this relationship.

Guardian_first_name	VARCHAR	15	This attribute contains the first name of the guardian of a Minor. Example: “Noor”
guardian_last_name	VARCHAR	15	This attribute contains the last name of the guardian of a Minor. Example: “Sadman”
guardian_relationship	VARCHAR	20	This attribute represents the relationship of the guardian with the Minor. Example: “Father”
minor_dob	DATE		This attribute contains the date of birth of a Minor. Example: “2023-05-19”
minor_maturity_date	DATE		This attribute contains the date of maturity of the Minor. Example: “2027-10-30”
guardian_address	VARCHAR	70	This attribute contains the address of the guardian of a Minor. Example: “42, Bashundhara, Dhaka”
guardian_city	VARCHAR	30	This attribute refers to the name of the city the guardian of a Minor lives in. Example: “Dhaka”
guardian_post_code	VARCHAR	5	This attribute contains the first name of the guardian of a Minor. Example: “Noor”
guardian_state	VARCHAR	20	This attribute contains the name of the state the guardian of a Minor lives in. Example: “Texas”
guardian_country	VARCHAR	45	This attribute contains the name of the country the guardian of a Minor lives in. Example: “Bangladesh”
guardian_telephone	VARCHAR	9	This attribute contains the telephone of the guardian of a Minor. Example: “029345621”
guardian_mobile	VARCHAR	12	This attribute contains the mobile number of the guardian of a Minor. Example: “212128787898”
guardian_fax	VARCHAR	12	This attribute contains the fax number of the guardian of a Minor. Example: “665965621788”

guardian_email	VARCHAR	50	This attribute contains the email address of the guardian of a Minor. Example: “baap@gmail.com”
guardian_passport_num	VARCHAR	18	This attribute contains the passport number of the guardian of a Minor. Example: “654987454659875678”
guardian_passport_issue_place	VARCHAR	20	Is the passport office from which the guardian’s passport was received
guardian_passport_issue_date	DATE		Is the date on which the passport was received in the format YYYY-MM-DD
guardian_passport_expiry_date	DATE		Is the expiry date of the guardian’s passport in YYYY-MM-DD
guardian_residency	VARCHAR	45	Is the resident country of the guardian
guardian_nationality	VARCHAR	20	Is the nationality of the guardian
guardian_dob	DATE		Is the guardian’s DOB in the YYYY-MM-DD format
guardian_photo	VARCHAR	16	Stores the memory address of the photo stored on the server
guardian_signature	VARCHAR	16	This attribute contains the memory address of the photo of the signature of the guardian of a Minor.

Nominee

Name	Datatype	Size	Remarks
account_number	VARCHAR	8	This is the primary key of this relationship.
title	VARCHAR	3	This attribute contains the title of a Nominee. Example: “Mrs”
name	VARCHAR	30	This attribute contains the name of a Nominee. Example: “Farzana Chowdhury”
address	VARCHAR	70	This attribute contains the address of a Nominee. Example: “66, Bashundhara, Dhaka”

phone_number	VARCHAR	11	This attribute contains the phone number of a Nominee. Example: “01654654582”
email	VARCHAR	20	This attribute contains the email of a Nominee. Example: “faria@gmail.com”
city	VARCHAR	45	This attribute contains the city the Nominee lives in. Example: “Dhaka”
state	VARCHAR	20	This attribute contains the name of the state the Nominee lives in. Example: “California”
post_code	VARCHAR	4	This attribute contains the postcode of the area the Nominee lives in. Example: “Mrs”
nid	VARCHAR	10	This attribute contains the National ID no. of a Nominee. Example: “2233654789”
dateofbirth	DATE		This attribute contains the date of birth of a Nominee. Example: “2023-09-05”
gender	VARCHAR	1	This attribute stores the gender of the Nominee
photo	VARCHAR	16	This stores the memory address of the photo stored on the server
signature	VARCHAR	16	Stores the memory address of the image on the server
nominee_type	VARCHAR	2	This attribute stores the type of the Nominee

Power of Attorney

Name	Datatype	Size	Remarks
bo_number	VARCHAR	16	This is the primary key of this relationship.
CDBL_account_no	VARCHAR	45	This attribute contains the CDBL account no. of a Power of Attorney. Example: “11111133333335”
name_of_account_holder	VARCHAR	30	This attribute contains the name of the account holder the Power of Attorney is in charge of. Example: “1212121326564”
attorney_name	VARCHAR	30	This attribute contains the name of the Power of Attorney. Example: “Shafiqul Islam”

attorney_address	VARCHAR	70	This attribute contains the address of a Power of Attorney. Example: “20, Wall Street, Salt City”
attorney_number	VARCHAR	11	This attribute contains the phone number of a Power of Attorney. Example: “01754694201”
attorney_passport_no	VARCHAR	18	This attribute contains the Passport Number of a Power of Attorney. Example: “4564645878524126”
attorney_country	VARCHAR	20	This attribute contains the country name of a Power of Attorney. Example: “Bangladesh”
attorney_nationality	VARCHAR	20	This attribute contains the nationality of a Power of Attorney. Example: “Bangladeshi”
attorney_dob	DATE		This attribute contains the date of birth of a Power of Attorney. Example: “2023-05-06”
attorney_date	DATE		This attribute contains the date of effectiveness of a Power of Attorney. Example: “2023-08-15”

Relationship manager

Name	Datatype	Size	Remarks
employee_id	VARCHAR	10	This is the primary key of this relationship.
phone_number	VARCHAR	12	This attribute contains the phone number of a Relationship Manager. Example: “0191420697”
email	VARCHAR	20	This is an attribute which contains the email of a Relationship Manager. Example: “khan@gmail.com”
nid	VARCHAR	10	This is an attribute which contains the number of a Relationship Manager. Example: “1030154561”
dob	DATE		This is an attribute which contains the date of birth of a Relationship Manager. Example: “2023-09-10”
nationality	VARCHAR	20	This attribute contains the nationality of a Relationship Manager. Example: “Bangladeshi”
photo	VARCHAR	16	This attribute stores the memory address of the photo of the Relationship Manager which is stored in the server.

signature	VARCHAR	16	This attribute stores the memory address of the photo of the Relationship Manager's signature which is stored in the server.
head_id	VARCHAR	10	This attribute is a foreign key and contains the id of the Head of Settlement the Relationship Manager works under. Example: "1023644921"

Value added service

Name	Datatype	Size	Remarks
account_number	VARCHAR	8	This is the primary key of this relationship. This attribute is the account number of the client. Example:"10003746"
internet_trading	VARCHAR	20	This attribute references the internet trading ID of the client. Example: "12345678943"
SE	VARCHAR	3	This attribute refers to the SE of the Client. Example: "Yes"
order_management_system	TINYINT		This attribute refers to the order management system of the client. Example:"1"
SMS_service	TINYINT		This refers to the SMS service attribute of the client. Example:"1"
email_service	TINYINT		This refers to the email service attribute of the client. Example: "0"

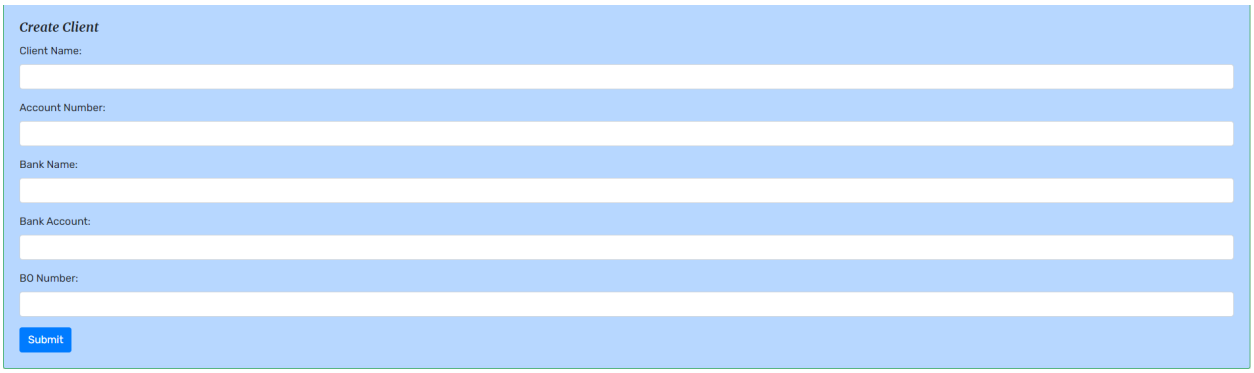
Workers under head

Name	Datatype	Size	Remarks
head_id	VARCHAR	10	This is the primary key of this relationship. This attribute is the ID of the head of the worker. Example: "2020734123"
worker_id	VARCHAR	10	This is a foreign key of this relation that is referred to as employee_id. Example: "3030734123"

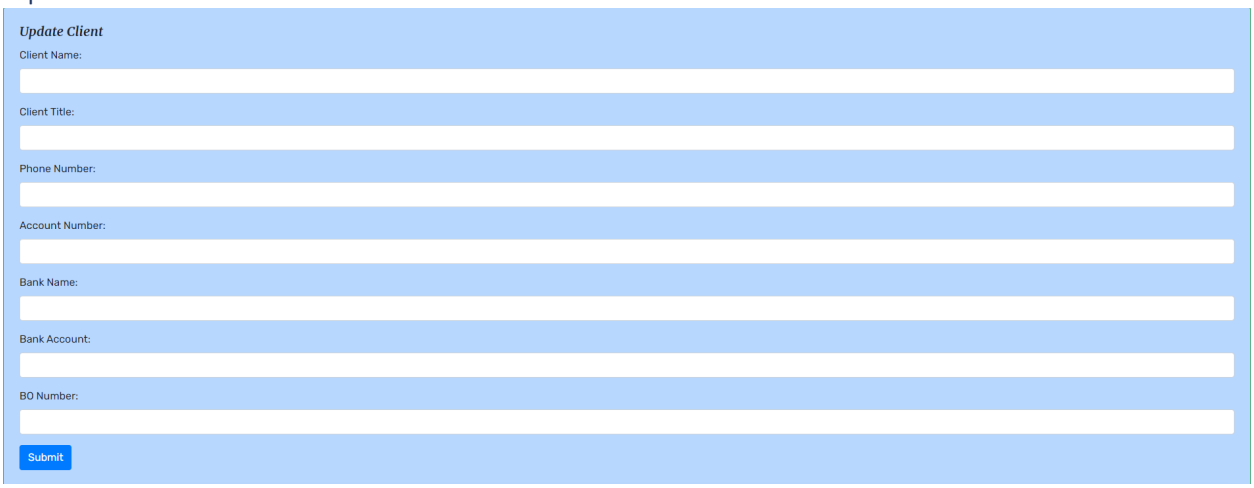
CHAPTER 04: PHYSICAL SYSTEM DESIGN

Input Forms

Create Client Form

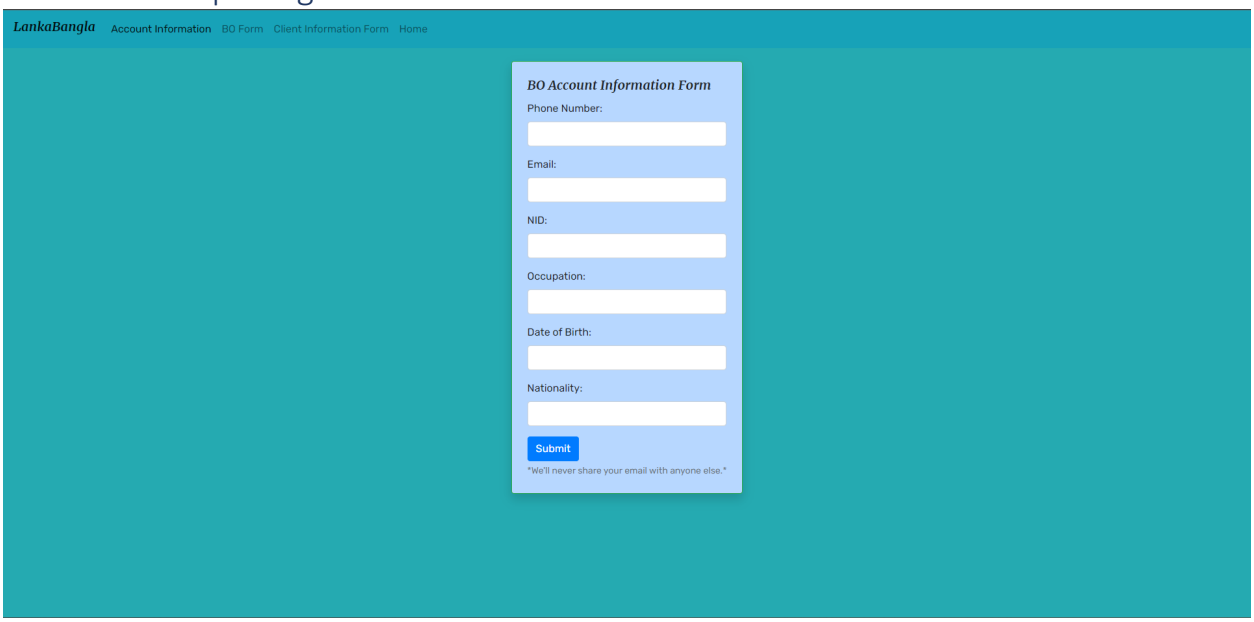


Update Client Form



Delete Client Form

BO Account Opening Form

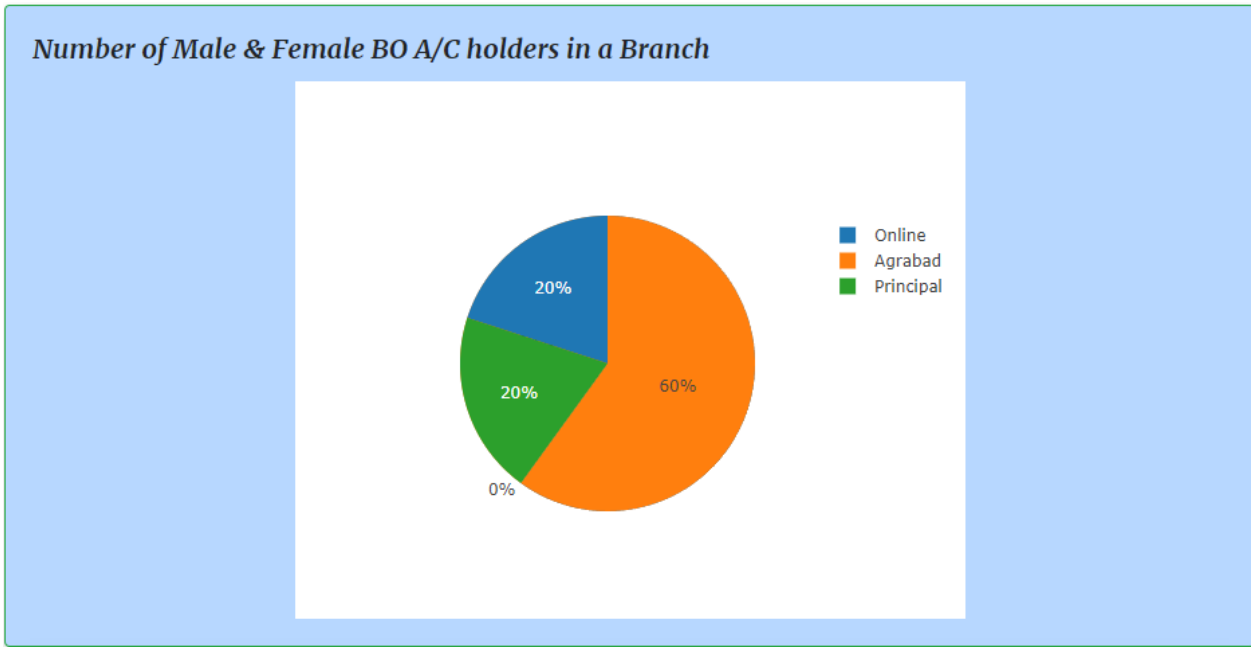


Code For Input Forms

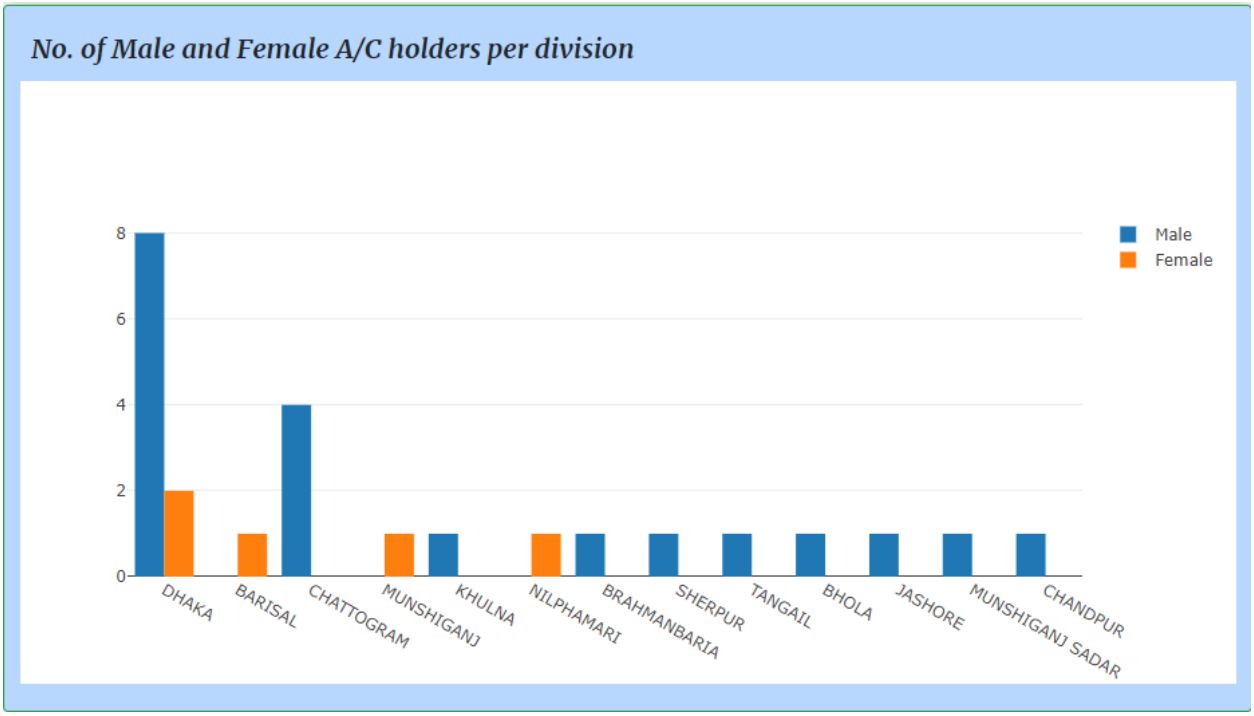
```
const express =  require('express');
const multer = require('multer');
const upload = multer();
const adminRoute = express.Router();
const db = require('../server/connection');
db.connect();
adminRoute.get('/',(req,res) => {
    res.render('adminDash');
})
/* db.query(sqlQuery, (error, results) => {
    if (error) {
        console.error('Error querying the database:', error);
        return;
    }

    // Pass the results to the EJS template for rendering
    // Render the template and pass the data
    adminRoute.get('/', (req, res) => {
        res.render('adminDash');
    });
}); */
//bank account_number : 100005010
//bo_account_number : 621230926322084
//Add the sql queries here
adminRoute.post('/', upload.none(), (req,res) => {
    const {postClientName, postClientAcc, postClientBank, postBankAccountNum, postClientBoNum} = req.body;
    bank_sql = `INSERT INTO lankabangla.bank (bank_name,account) VALUES ("${postClientBank}","${postBankAccountNum}")`;
    //parent tables must be filled first
    db.query(bank_sql,(err,results) => {
        if (err) throw err;
        console.log('bank account added');
    });
    bo_sql = `INSERT INTO lankabangla.bo_account (bo_number) VALUES (?)`;
    db.query(bo_sql,[postClientBoNum],(err,results) => {
        if(err)throw err;
        console.log('bo account addded');
    });
    //client is a child table
    client_sql = `INSERT INTO lankabangla.client (account_number,client_name,bo_account_number,bank_account_number) VALUES ("${postClientAcc}","${postClientName}","${postClientBoNum}","${postBankAccountNum}");`;
    db.query(client_sql, (err,results) => {
        if(err) throw err;
        console.log('client Added.');
    })
});
//Finish delete and put requests
adminRoute.delete('/',upload.none(), (req,res) => {
    const {delClientName, delClientAcc, delBankAccountNum, delClientBoNum} = req.body;
    //delete child records first
    client_sql = `DELETE FROM lankabangla.client (account_num, client_name,bo_account_number,bank_account_number) VALUES
    (${delClientAcc},${delClientName},${delClientBoNum},${delBankAccountNum});`;
    db.query(client_sql, (err, results) => {
        if(err) throw err;
        console.log('client deleted');
    })
})
module.exports = adminRoute;

adminRoute.put('/',upload.none(),(req,res) => {
    const {updateClientName, updateClientTitle, updateClientPhone,updateClientAcc,updateClientFather,updateClientMother} = req.body;
    client_sql = `UPDATE lankabangla.client SET title = "${updateClientTitle.toUpperCase()}",phone_number = "${updateClientPhone}",father_name = "${updateClientFather}", mother_name = "${updateClientMother}" WHERE client_name = "${updateClientName}" AND account_number = "${updateClientAcc}";`;
    db.query(client_sql,(err,results) => {
        if(err) throw err;
        console.log('update succeeded.');
    })

})
```

Output Charts

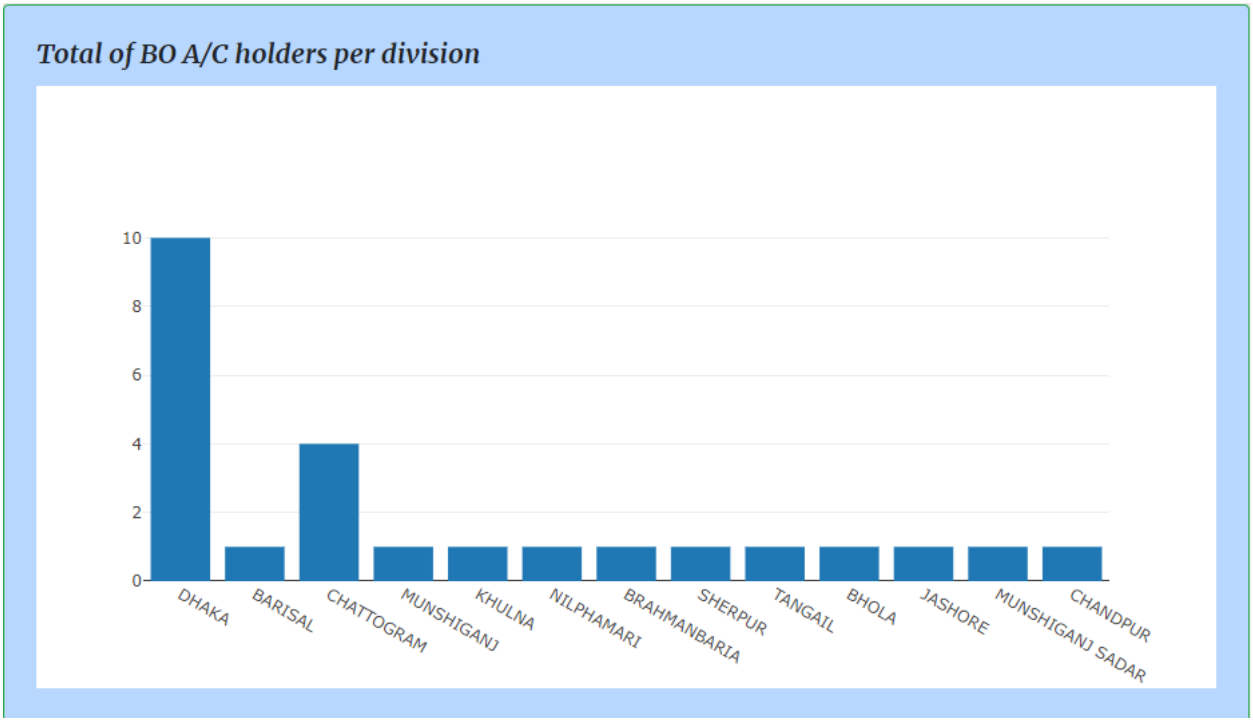
Number of Male and Female BO A/C Holders per Branch



Number of Male and Female BO A/C Holders per Division



Total Number of Male and Female BO A/C Holders per Division



Code For Chart generation

```
var male_data_per_branch = {
  values: [12,8,0],
  labels: ['Online','Agrabad','Principal'],
  name:'Male',
  type: 'pie'
  };

  var female_data_per_branch = {
    values: [1,3,1],
    labels: ['Online','Agrabad','Principal'],
    name:'Female',
    type: 'pie'
  };

var data_per_branch = [male_data_per_branch, female_data_per_branch];

var layout_per_branch = {
  height: 400,
  width: 500
};

Plotly.newPlot('myDivPerBranch', data_per_branch, layout_per_branch);
```

```
var data_per_div = {
  x: ['DHAKA','BARISAL','CHATTOGRAM','MUNSHIGANJ','KHULNA','NILPHAMARI ','BRAHMANBARIA','SHERPUR','TANGAIL','BHOLA','JASHORE','MUNSHIGANJ SADAR','CHANDPUR'],
  y: [10,1,4,1,1,1,1,1,1,1,1,1,1],
  name:'Male',
  type: 'bar'
  };
var total_data_per_div = [data_per_div];

var total_layout_per_div = {barmode: 'group'};

Plotly.newPlot('myDivTotalPerDivision', total_data_per_div, total_layout_per_div);
```

CHAPTER 05: Conclusion

PROBLEM AND SOLUTION

The Current System that LankaBangla Holdings is very outdated as they are currently not implementing a database. This is making their BO Account opening and editing process very difficult and time consuming. The solution to this problem is creating a web App that helps their clients open BO Account by filling forms online. This removes the dependent of storing and maintain their physical paper forms.

ADDITIONAL FEATURE AND FUTURE DEVELOPMENT

For the proposed system, we feel like the system is already in a perfect system as per the requests the staff of LankaBangla Securities presented to us. However, if further improvements were to be made, we would suggest making the external processes such as verification processes of CDBL, EC, NBR to be brought into the system.

CONCLUSION & RECOMMENDATIONS

After implementing the proposed changes, we believe that the system cannot be further improved and is already in the best condition. We believe that by using this software, the internal processes of the services LankaBangla Securities provide can be mostly digitalized and simplified. This would enhance the overall efficiency of the services of LankaBangla Securities and make it more user-friendly.

References

"About Us." *LankaBangla Finance PLC.*, 17 Jan. 2023, www.lankabangla.com/about-us/.