Introduction

International Netherlands Group

Internationale Nederlanden Groep (International Netherlands Group), or more commonly known as "ING" or "ING Group", is a Dutch multinational banking and financing company, present in more than 40 countries with more than 38 million customers. Its headquarters are in Amsterdam and is recognized as one of the 30 biggest banks in the world. ING's full suite of services includes retail, direct, commercial and investment banking, and retail market products such as savings, payments, loans, and mortgages.

ING has been operating since the early 1900s under the name of Nederlandsche Middenstands Bank (NMB) but has since merged with insurance company Nationale-Nederlanden, and renamed to create the ING Group by 1991. Since then, it's had over 17 further acquisitions. Its purpose is to "empower people to stay a step ahead in life and in business" by promising customers clear and easy banking that is available anytime and anywhere, and to keep getting better to further empower people. The company values revolve around honesty, prudence, and responsibility.

Ever since its inception, ING has been known to be an innovator in banking. By 1997, ING pioneered branchless banking - banks without any branch network that offers its services remotely via online banking or telephone banking. Today, most of their efforts are centered on being a global pioneer and leader in digital banking, and has been awarded the Best Bank in the World in 2017 by the Global Finance magazine.

ING Philippines

By 1990, ING has already expanded into the Philippines through the now known ING Philippines - primarily providing commercial banking services to international and local corporations. ING Philippines operated its financial services business to business, and does not have any existing brick and mortar retail banking setups in the country. However, in May 2019, ING Philippines strategically added a differentiated service in the country, by implementing the first all-digital banking platform in the Philippines - the *"ING All Digital Bank Application"*.

ING Philippines brought in from ING Group and launched the digital bank with a 2-fold goal in mind. First, they wanted to implement a sustainable process for banking and financial services in the modern age, and second, they wanted to promote a savings mindset among Filipinos as the first step toward empowering them to reach their goals.

The *ING All Digital Bank Application's* current highlighted services offered are online cheque deposits, and savings accounts, with a 4% interest rate that doesn't require a minimum balance. Some of the notable service offerings and features of the *ING All Digital Bank Application* in the Philippines are as follows:

1. Onboarding, signing up, or creation of an account is done through the ING app
2. All transactions are conducted through the ING app
3. Usage of facial recognition technology and biometrics login for security purposes
4. Fund transfers and deposits from other banks without charge that can be done anytime and anywhere
5. 24/7 customer service with a chat feature
6. Has various checks during the transaction process for authentication which uses encryption and authentication mechanisms
7. Free generation of electronic bank statements through the application

Digital Banking v.s. Online Banking

Online banking services have been ubiquitous in the Philippines over the past few years. However, what separates ING Philippines is that they offer digital banking services, which is its highly distinct feature.

Online banking refers to banking services where customers can manage their accounts over the internet, as opposed to going to a brick and mortar store. However, for onboarding, KYC, support, and other functions - a customer may still need to visit branches. Online banking focuses on digitizing the "core" aspects of banking alone.

Digital Banking, however, is the next phase of online banking. Instead of just digitizing the "core" aspects of banking, it digitizes every program and activity undertaken by financial institutions and their customers as well. Digital banking employs advanced transaction capabilities such as the use of QR, e-commerce, and cash backs, to name a few. Digital banking also delivers digital platforms for customer onboarding, KYC, activation, transaction, and support.

Information Systems in Place

With digital banking requiring the migration of the entire banking process to online, ING Philippines then requires extensive data storage and data analysis, thereby requiring sizeable and flexible information systems as well. ING Philippines currently has numerous advantages in this aspect of the business, in comparison to its competitors, for 2 main reasons.

First, ING Philippines may just adopt the information systems of ING Global. Currently, ING Philippines uses 3 sources of software. The most common source is **Common Off the Shelf Information Systems** - which are listed as follows
 a) Smart Security Management Systems and Servers (KOBIL Systems Solutions)
 b) Data and Business Analytics Tools (Windows Power BI, Microsoft SQL Developer, Windows PowerShell, Microsoft SharePoint, Hive, Netezza, Cassandra, Matpotlib, Cognos, etc.)
 c) Process Management Tools (ARIS)
 d) Facial recognition and other biometric authentication processes (KOBIL Systems Solutions)

In addition to these, ING Philippines also uses **Cloud Computing** to maximize international databases; real-time updates for check clearing, customer service, bank transfers, and deposits - since all can be done anytime and anywhere; and interbank check clearing locally and internationally. Should, both COTS and the Cloud be insufficient, ING Philippines also has its own group of **In-House Developers** to prototype information systems that may be needed.

Second, due to the presence of its In-House Developers, ING Philippines is able to adopt a more flexible and forward-looking approach to systems development.

System Development Approach of ING

Currently, ING Philippines has adopted the information systems of the global ING Group. However, these systems are not completely pertinent to the requirements and needs of the local Philippine environment. In order to meet the continuously changing and dynamic requirements of the new local environment, ING Philippines improves its information systems development through Agile Methodologies and DevOps.

DevOps or Development and Operations is an enterprise software development phrase used to mean a type of agile relationship between development and IT operations. In ING Philippines, where they have multiple digital product offerings with varying information system needs, each product team is assigned a Product Owner (the total manager) who strategizes and subsequently coordinates with an IT team to primarily prototype and execute the system development needs of certain product teams.

A current problem is how these developed systems are not optimized because they are not tested and implemented fast enough. Consequently, there is a lapse between the client's needs and what system is created. Since ING is new in the Philippines, information systems might have to be developed or modified to better fit the needs of the product teams in the country. Being agile does not only translate to adapt to ever-changing IT needs but adhering to the "end-to-end" principle and working in cross-functional teams that anticipate the clients' changing needs. Hence, this presents a need to fortify ING's systems development, to optimize its introduction in the country.

Project Goals

Project Scope, Resources, Feasibility, and Deliverable

The focus of ING Philippines in its introduction of digital banking in the country is to fortify the interfaces and information systems of its 3 main services - onboarding or signing up, and the deposit and transfer to and from savings accounts. However, the current problem of ING Philippines is that their developed systems are not optimized for the Philippine market. There are several reasons attributable to these, such as the lack of skills of Filipino employees, and the varying expectations and preferences of Filipino customers when it comes to digital banking. However, an overarching reason for the current struggles of ING Philippines to optimize its digital application is due to the varying regulations in the Philippines that complicate the tasks and requirements of ING Philippines's information systems. Particularly, the Banko Sentral ng Pilipinas employs tight information-sharing regulations between banks, as opposed to regulatory boards abroad. Given this, there is an opportunity to create a pertinent localized system, that is still simple and convenient to use for both users and employees of ING. These systems must also be forward-looking to prime ING Philippines as it expands the product offerings of its digital bank.

The scope of this project is merely to deeply analyze the current systems, design, and situation of ING; to identify potential improvements to the current system and interface design; to explain these improvements; and to create a basic report that explores potential improvements that ING employees may further improve on.

A huge limitation of this study in terms of feasibility is that our contact ING employees are not allowed to disclose highly-specific information regarding their processes and information systems, and that the group was merely given a timeframe of 1½ months to perform our project. Given this, our contact ING employees only provided the group with a basic understanding of ING Philippines, and would hope to use the report to have a better grasp of their current situation, which they can coordinate with their IT teams and extrapolate should our report be applicable.

The team would have been able to perform a better study if our report is solely to be disclosed to ING employees, and that if our time horizon were 3 months as this provides an ample length of time to have a better understanding of how the systems of ING work.

Strategic Alignment and Potential Benefits

ING Philippines wants to refine the interfaces and information systems of its current ING digital bank offerings to optimize its operations and gain a large competitive advantage in the industry. The company also desires these systems to set their groundwork, to prepare them for growth once they introduce added services. With our report, ING teams may look into our basic idea explorations, extrapolate on concepts and improve on our suggestions, and hopefully prototype a system that can satisfy the company's current strategic needs.

Analysis - Requirements Determination

To analyze the current situation of ING, we begin by understanding the requirements of their current information systems in place. We focused on the most feasible methods given the team's 1½ months and confidentiality constraints. Upon consulting with ING employees, the most feasible to accomplish were to interview individuals, to interview groups, and to analyze business interfaces and documents.

Method	Rationale
Interviewing individuals	- Product Owners or Product Managers know what is needed out of the information systems, and if the information systems actually deliver. - IT officers know what the systems are capable of and what can be developed - Interviewing both Product Managers and IT Officers can show what needs or opportunities can still be reconciled. - In order to assess which systems and features are given more weight by the employees. - To pinpoint which areas or functions require further improvements
Interviewing groups	- Interview groups by function to have a clearer understanding of the current systems of ING - To have an idea of how teams work to achieve the goals of the company and find out which areas need improvement
Analyze Business Documents	Acquire a better idea on what systems are currently implemented and how they function and what problems or business goals they address

Aside from the methods aforementioned, the group believes the following should have been employed under better circumstances, such as having more time and more cooperation from ING.

Method	Rationale
Observing workers	- Obtain a firsthand measure of employee interaction with the systems, and how consistent insights are with those received from interviews - May be used to identifying opportunities workers are not aware of due to their lack of understanding of the systems - Will be of least priority, as behaviors may change
Joint Application Design (JAD)	- Have a detailed idea of the existing system employed by ING - Easily pinpoint the areas for improvement - Obtain valuable insights and ideas from key individuals that make up the "end-to-end" concept viable and effective for further tweaking - Refine system details and troubleshoot potential areas of development to adapt to consumers' evolving needs
CASE Tools	- Can be used to optimize JAD sessions, as ING has the resources anyway - System models can be prototyped and immediately shown - Can be used to analyze the consistency of all diagrams, forms, and reports, so that our analysis of the current systems can be more accurate, and so will our recommendations
System Prototypes	Coverts ideas and system requirements to a working version

	● Quickly identify system problems and issues that can be revised accordingly ● However, user requests in mobile banking are straightforward and do not invite ambiguities when specifying design systems ● Prototypes are difficult to adapt to a general user audience, who are considered to be the main target market of the mobile application.
Business Process Reengineering (BPR)	● ING has taken radical steps since 2014, to reorganize the complete flow of data in major sections of the company, even restructuring to adopt Agile Methodologies and DevOps ● They are currently looking for disruptive technologies that will revolutionize the banking industry ● The steps being implemented now may be a reliable gauge in determining possible future improvements in their system.
Agile Methodologies	● To establish an environment where building, testing, releasing software can happen rapidly, resonating with clients' changing needs. ● Respond timely with evolving IT needs and technological advancements ● Adapt to dynamic and fluid recognition of software requirements ● Associate each interaction context with a user interface for the system, and prototype the interaction context. ● Focused on user goals, roles, and tasks that require continuous user involvement
Electronic Commerce Applications	● Mobile applications are integral to ING as a digital bank as all financial transactions are coursed through them ● Application capabilities, layout, and navigation characteristics are important considerations not only for consumers but also for their employees - if it performs according to what they need and want the applications to do

Analysis - Current Information Systems of ING

Requirements Structuring - DFD

   Through our interviews and analyses of processes, the group was able to come up with the following understanding of how ING Philippines current systems work.

Level 0 - DFD

   ING offers a handful of commercial services, and consumers are able to enjoy these through the current digital application that allows them to handle all their financial and banking transactions at the convenience of their phones. In the ING application, the consumer can interact with up to 7 processes to exchange data. Here, we have created a data flow diagram to map out the relevant data processes that transpire in ING's Mobile application. The most basic stage, level 0 shows us the important steps that a customer has to fulfill to complete a transaction.
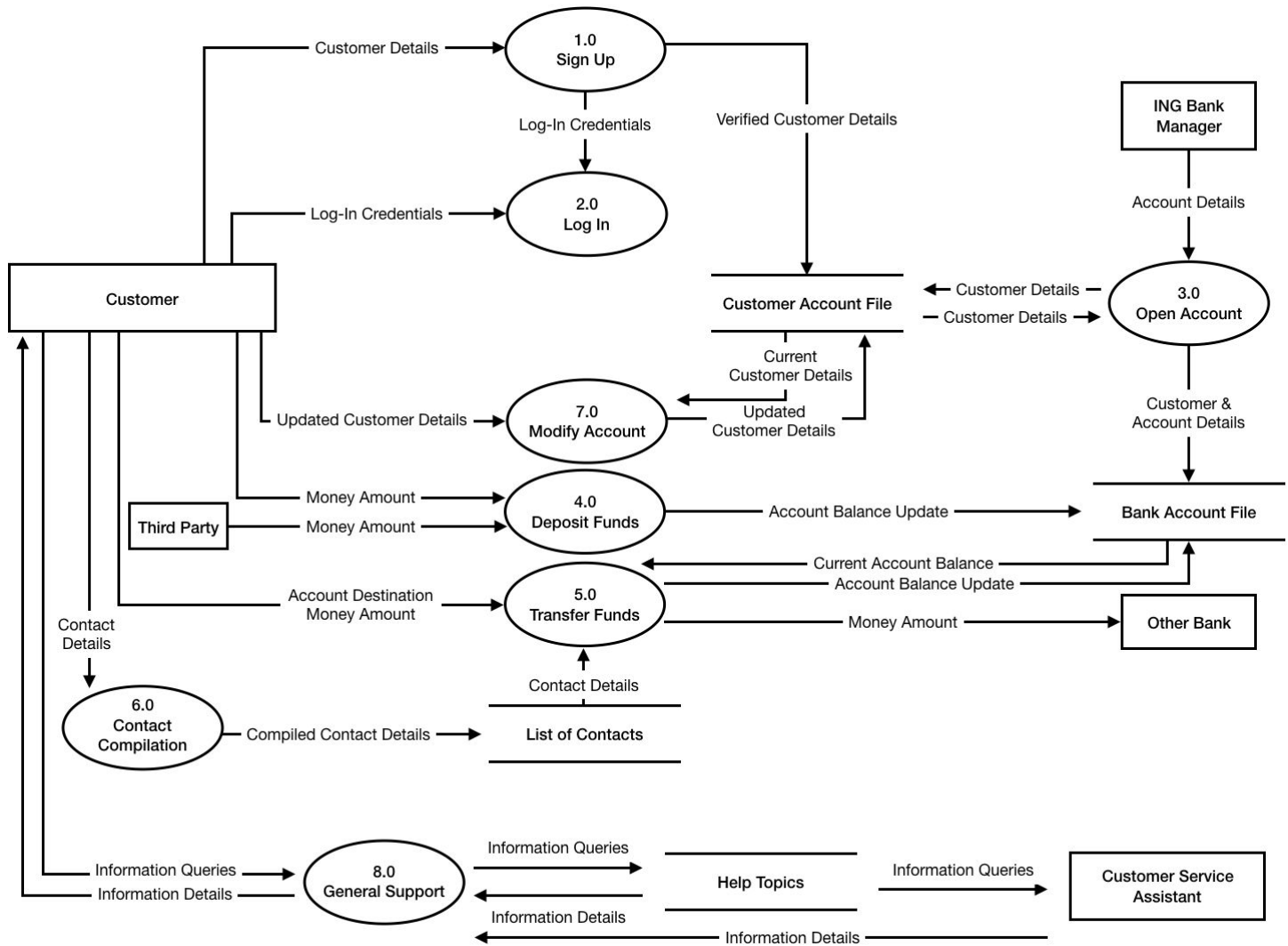
   Before a consumer is able to access the features of the application, he or she must first go through onboarding. Onboarding is the process in which consumers sign up and input several data to be able to create their accounts. These data must then go through multiple verification points in order to ensure the authenticity of each consumer's data and information, and leads to another data flow diagram to be explained later.

   After the sign-up process, consumers can now sign-in to the application, and should they desire, change the information they have previously submitted during onboarding, but again subject to verification. Once logged-in, consumers have the option to either do two of the following: deposit funds into his own account or transfer funds to someone else even to another bank. These transactions are monitored by an ING bank manager to ensure the integrity of the data and processes that transpire within the application. Transactions may also be sped up by creating a list of contacts through the contact compilation process. Instead of the consumer manually inputting information every single transaction, a user can source information from a list of contacts that automatically fills the information needed to complete a transaction.

   In case of any questions or inquiries, ING takes pride in having a 24/7 support service to aid its users in navigating through the application. It features general support with the frequently asked questions of customers, as well as a customer service assistant for more technical concerns.

   All information is stored in 4 data stores, and data can come from or go to up to 5 sources and sinks. Each account will be assigned customer account files for their personal data, bank account files for their financial data, list of

contacts to expedite processes of some transactions, and help topics for ING to easily answer their questions. Customers, ING employees, and third party individuals and banks are the individuals often involved.

Application System	Processes

1. Log-in pages
   a. Terms & Conditions
   b. Name
   c. Email Address
   d. Mobile Phone for verification
   e. Verification code
   f. Passcode
   g. Activate Face ID
   h. Select document type (Government-issued documents)
   i. ID and birth information
   j. Residential and mailing address
   k. Work Information
   l. Tax Information
   m. FATCA Information
   n. Signature
   o. Verification Completed
	1.0 Sign up
	2.0 Login

2. My Account Home Page
    a. Deposit
    b. Transfer
	3.0 Open account

3. Deposit	4.0 Deposit Funds
4. Transfer	5.0 Transfer Funds
5. Contacts	6.0 Contact Compilation
6. Profile	7.0 Modify Account
7. Support	8.0 General Support

Process:
1. Sign up - Due to the business nature of banks, new users are required to undergo a stringent verification of various details (e.g. Name, Face ID, Work Information, etc.) to create an account.
2. Login - For existing users, log in details such as username and password are inputted to be able to access their personal accounts.
3. Open Account - The open account serves as the home page of the ING Mobile Banking applications as a portal for users to opt to either deposit or transfer funds from their accounts.
4. Deposit Funds - ING's application is recognized as the first BSP approved online mobile banking that allows individuals to transfer funds simply through photos of cheques.
5. Transfer Funds - Users are permitted to electronically wire funds to other banks free of charge through PesoNet and instaPay platforms.
6. Contact Compilation - The application provides a contact list of individuals the user frequently interacts with.
7. Modify Account - Personal information may change over time, giving the user the option to alter any incorrect details inputted. This process will again come with the proper verification to ensure the integrity of the usage of the application.
8. General Support - As mobile banking is considerably a novel concept, users may not be accustomed to the new system. Thus, a 24/7 customer service is crafted by ING to be able to provide guidance to the user for any inquiries and concerns they may have.

Data Store:
1. Customer Account File - After sufficient information has been garnered for users to set up their personal accounts, verified information is then compiled to create a customer account file.
2. Bank Account File - The bank account file reflects the user's current real-time balance after deposits and transfers of cash.
3. Help Topics - Help topics are designed to assist users for common concerns and inquiries they may have to aid them in navigating through the application.
4. List of Contacts - An aggregated list of the user's contacts is accessible in the application to achieve frequent deposits and transfers of cash easier.
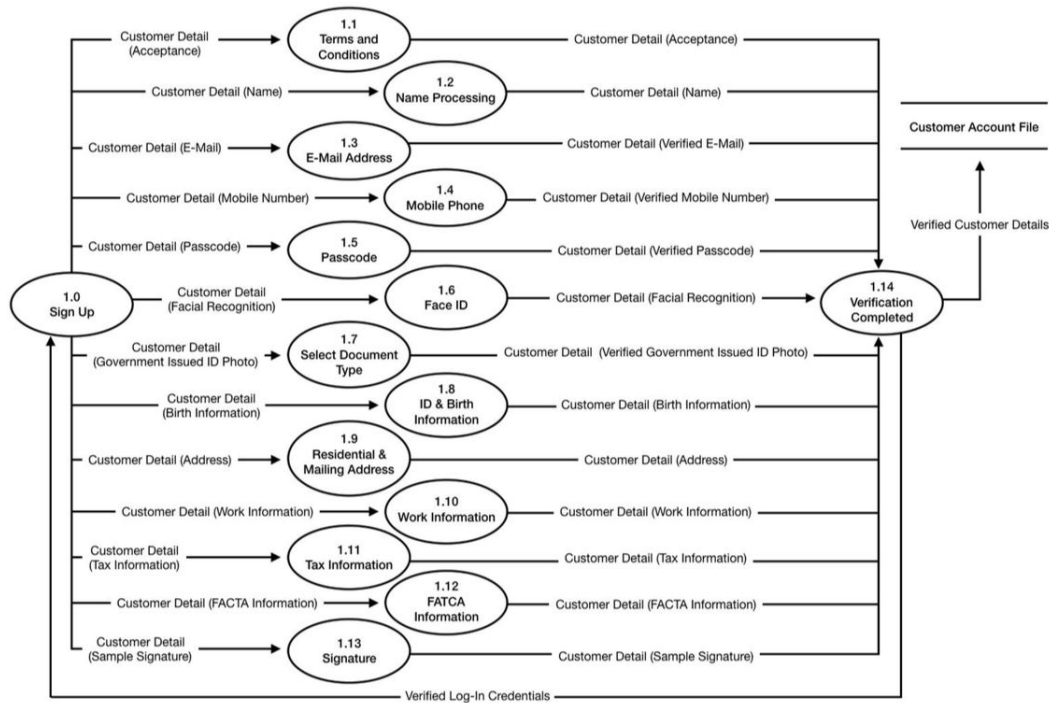
Source/ Sink:
1. Customer - Customers are considered the end-users of the application. To be able to access the features of the application, they are required to provide personal information and the details aforementioned. Customers are also the beneficiaries of ING's features, specifically the General Support of the application.
2. Third-Party - Other individuals, aka third parties, directly deposit cash to the user's account.
3. Other Banks - Since ING offers an interbank exchange of funds, various financial intermediaries act as clearinghouses and recipients to amounts transferred to their clients' accounts.
4. ING Bank Manager - Bank managers also provide essential information to ensure the integrity of each client's account.
5. Customer Account Assistant - ING takes pride in offering a 24/7 customer service platform for its users that provides proper guidance in case of inquiry and concerns.

Level 1 DFD

Although the onboarding process may seem relatively simple for the user, the back-end of the processes used is too complicated. Coders and employees have to facilitate and handle numerous processes and sub-processes that fabricate a complex system - in 2 more levels of data flow.

In the next level of the sign-up process, most of the information inputted is further verified. This process takes approximately 3-5 working days per account that will be created. Some of this information are automatically verified by the systems of ING Philippines such as the Terms and Conditions Acceptance; others are verified through 3rd party processes in further data flow systems to be explained later; while others are manually verified by individuals, such as ID and birth information, legal name, and others, after prior processes have been verified.

Application System	Processes
1. Name 2. Email Address 3. Mobile Phone for verification 4. Verification code 5. Passcode 6. Activate Face ID 7. Select document type (Government-issued documents) 8. ID and birth information 9. Residential and mailing address 10. Work Information 11. Tax Information 12. FATCA Information 13. Signature 14. Verification Completed	1.1 Accepting the Terms and Conditions 1.2 Name Processing 1.3 E-Mail Address Inputting and Verification 1.4 Mobile Phone Inputting and Verification 1.5 Passcode Generator 1.6 Face ID Activation 1.7 Selection of Document Type 1.8 ID & Birth Information Inputting 1.9 Residential & Mailing Address Inputting 1.10 Work Information Inputting 1.11 Tax Information Inputting 1.12 FATCA Information Inputting 1.13 Signature Submission 1.14 Final Verification

Process:
1. Accepting the Terms and Conditions - The customer must accept the terms and conditions before moving forward
2. Name Processing - The customer inputs their full name
3. E-Mail Address Inputting and Verification - The customer inputs their e-mail address, and this is verified by ING's

back-end.
4. Mobile Phone Inputting and Verification - The customer inputs their mobile number, and this is further verified by ING.
5. Passcode Generator - The customer inputs a passcode, which ING will verify in terms of strength.
6. Face ID Activation - The customer activates the Face ID feature, which ING secures through a third party security system provider.
7. Selection of Document Type - The customer selects from a range of government-issued documents, and uploads a photo of one for verification by ING
8. ID & Birth Information Inputting - The customer inputs their ID information once again along with Birth Information.
9. Residential & Mailing Address Inputting - The customer inputs their addresses.
10. Work Information Inputting - The customer inputs their work information.
11. Tax Information Inputting - The customer inputs their tax information, and is taken into further steps depending on their inputs, for verification.
12. FATCA Information Inputting - The customer inputs their FACTA information, and is taken into further steps depending on their inputs, for verification.
13. Signature Submission - The customer submits a photo of their signature for legal purposes.
14. Final Verification - all information must first be verified before the customer's log-in credentials are given, and all these verified information are stored in the customer's account file.

Data Store:
1. Customer Account File - All verified information from all the processes will then be transferred to the customer account file, which will be a source of data of other processes. The Customer Account File may also be modified by process 7.0 should it be found necessary by the customer

LEVEL 2 DFD
Some data run through further 3rd party systems to be verified. An example of this is that in order to check the validity and authenticity of document types, a KYC engine is used by ING Philippines to do so. KYC engines run their own processes and return verified information back to ING Philippines.
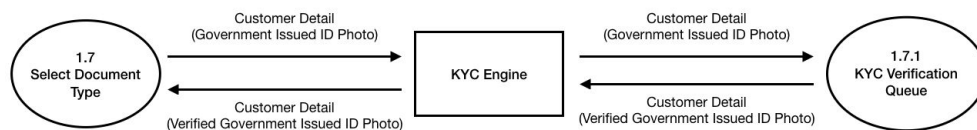
Application System	Processes
Select document type (Government-issued documents)	1.7.1 KYC Verification Queue

Process:
1. KYC Verification Queue - Information received from the customer's input in the Sign-Up page will be further verified by a KYC or "Know Your Customer" system. This system will be used to track if the information given is authentic and are legal, and that the customer has no potential risk of illegal intention towards the business.

Source/Sink:
1. KYC Engine - The information from the Sign Up page will be forwarded to the KYC Engine before it is further processed by the verification queue. The verification queue will then state in the KYC engine if the information provided is indeed authentic and legal, and the verified information will then be returned to the level 1 DFD.

Requirements Structuring - E-R Diagrams
With the aforementioned understanding of how the data flows within the ING systems, data models are created to show relationships between entities. The E-R diagrams were created through a bottom-up approach. The current E-R Diagram is seen on the next page.
Similar to customary banks, ING's mobile banking also includes a **customer** that desires to obtain all the financial services, a traditional bank has to offer. This is accomplished by creating a **bank account** that is monitored by

ING's **employees**. The user also has **contacts** to be able to frequently make **transactions** with other individuals with ease. For any queries and concerns that may arise, ING takes pride in its 24/7 customer service that offers **help topics** and **answers** for any **questions** users may have. All the aforementioned entities are where information is to be stored, specific to the nature of ING's Mobile Banking application. In addition, all information is tagged with their respective unique alphanumeric ID numbers for easier identification and retrieval. The following table explains the relationship and cardinalities of each entity and their respective primary keys.

Entity	Primary Key	Explanation
Customer	Customer_ID	● Each customer should have his/ her unique user identification to be distinctive in ING's system ● A customer may have multiple contacts, but contacts should be owned by primarily one user
Contact	Contact_ID	● Each customer should have access to the contact ID of his/her contacts. ● This is to efficiently conduct transactions between the customer and any of his/her contacts.
Bank Account	Account Number	● A user is entitled to his/ her specific bank account(s) to permit transactions with other individuals ● A customer may own one or more accounts, but a bank account should be owned by one individual or entity ● Bank account(s) is/are created and monitored by one or more employees, while employee(s) create and monitor one or more accounts ● Bank account(s) may send or receive one or more transactions, but transactions are only sent or received by one bank account
Employee	Employee_ID	● Each of ING's employees possesses a unique employee ID to allow them to create and monitor the bank account(s) of customer(s) ● There are many employees that may handle multiple bank accounts that are assigned to them
Transaction	Transaction_ID	● Each transaction made in the application is generated a unique code as the Transaction ID ● Bank account(s) can send multiple transactions, although each transaction must be sent by a specific bank account ● On the other end of the transaction, multiple transactions may be received by a bank account ● Each transaction must be received by a corresponding bank account
Help Topics	HELP_ID	● Commonly asked questions are given keywords that are assigned to specific help topics, which are given a help id ● Help Topics may contain a number of questions, based on whether it contains matching or similar keywords
Questions	QUESTION_ID	● Through the application, customers can seek assistance by submitting questions, which are given a unique id ● Questions that contain matching or similar keywords are part of help topics ● Each question id is specifically matched to only one help topic ● Each question will receive only one specific answer
Answers	ANSWER_ID	● Answers for the questions are generated unique identification codes ● Answers directly answer only one corresponding question, and vice versa
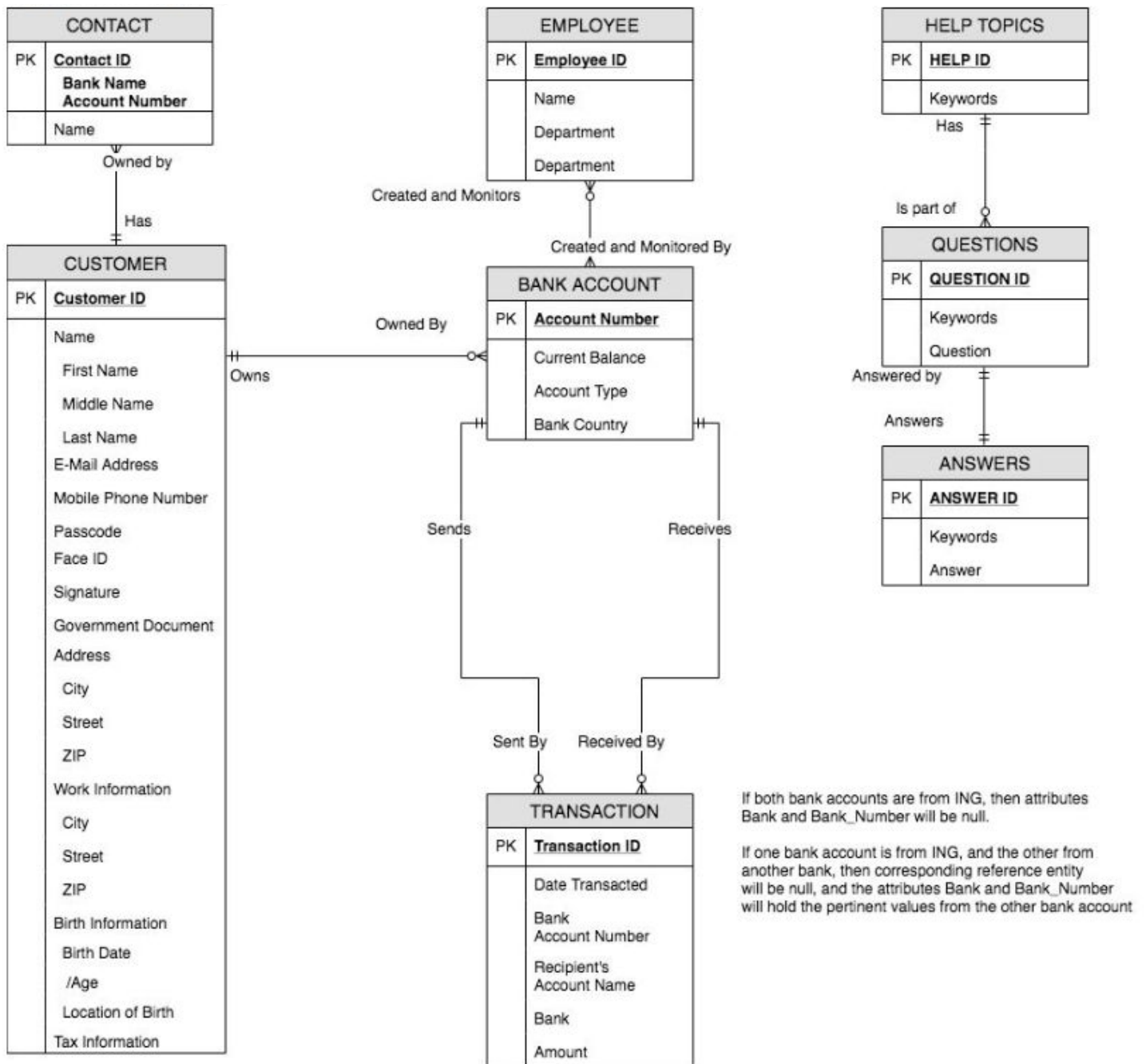
Database Design

Derived from the E-R Diagram above and their respective attributes and cardinalities, both logical and physical database design in its 3rd normalized form are presented below. VARCHAR(100) as a data type is often used despite some fields having a seemingly finite length - such as ID numbers - as VARCHAR() allows for flexibility should field lengths change in the future once ING Philippines expand or grow.

CONTACT

Bank Name: VARCHAR(100)	Bank Account Number: VARCHAR(100)	Contact Name: VARCHAR(100)	Customer ID: VARCHAR(100)
ING	NL29 INGB 0384 2067 98	Joselle T. Rivera	ING22345
CIMB	CIMBGB2L329	Antonette D. Mendoza	CIMB24945

- Bank Name and Account numbers are primary keys, Customer ID is a foreign key (from Customer database)

CUSTOMER

Customer ID: VARCHAR(100)	First Name: VARCHAR(100)	Middle Name: VARCHAR(100)	Last Name: VARCHAR(100)	E-Mail Address: VARCHAR(100)	Mobile Phone Number: NUMBER	Passcode: VARCHAR(100)	Face ID: BLOB	Signature: BLOB	..
ING11343	Louie	Medina	Santos	lmsantos1@gmail.com	+639178065422	lmSant0s1			

..	Government Document: BLOB	Address City: VARCHAR(100)	Address Street: VARCHAR(100)	Address ZIP: VARCHAR(100)	Work City: VARCHAR(100)	Work Street: VARCHAR(100)	Work ZIP: VARCHAR(100)	Birth Date: DATE	Location of Birth: VARCHAR(225)	Tax Information: BLOB
		Caloocan City	Buagan St.	1404	Quezon City	Laurel St.	1101	12/31/1974	Quezon City	

- Customer ID is a primary key

EMPLOYEE

Employee ID: VARCHAR(100)	Employee Name: VARCHAR(100)	Employee Department: VARCHAR(100)
ING2017541	Marielle D. Torres	Retail Banking
ING2015003	Nathan T. Florendo	Retail Banking

- Employee ID is a primary key

BANK ACCOUNT

Bank Account Number: VARCHAR(100)	Current Balance: NUMBER	Account Type: VARCHAR(100)	Bank Country: VARCHAR(100)	Customer ID: VARCHAR(100)
NL29 INGB 0384 1948 98	545,000	Savings	Philippines	ING11343

- Bank Account Number is a primary key, Customer ID is a foreign key (from Customer database)

BANK ACCOUNT-EMPLOYEE

Bank Account Number: VARCHAR(100)	Employee ID: VARCHAR(100)
NL29 INGB 0384 1948 98	ING2017541
NL29 INGB 0384 1948 98	ING2015003

- Bank Account Number (from Bank Account database) and Employee ID (from Employee database) are foreign keys

TRANSACTION

Transaction_ID: VARCHAR(100)	Date Transacted: DATE	Amount: NUMBER	Recipient's Account Name: VARCHAR(100)	Bank: VARCHAR(100)	Bank Account Number: VARCHAR(100)

| TRNSCT125 | 10/25/19 | 5000 | Louie M. Santos | ING | NL29 INGB 0384 1948 98 |
| TRNSCT321 | 10/25/19 | 2000 | Antonette D. Mendoza | CIMB | CIMBGB2L329 |

- Transaction ID is a primary key, Bank Account Number is a foreign key (from Bank Account Database)

HELP TOPICS

Help ID: **VARCHAR(100)**	Keywords: **VARCHAR(100)**
HLP0387	Account set-up
HLP4209	Bank transfer, inter-bank transaction

- Help ID is a primary key

EMPLOYEE-HELP TOPICS

Employee ID: **VARCHAR(100)**	Help ID: **VARCHAR(100)**
ING2017541	HLP0387
ING2015003	HLP4209

- Employee ID (from Employee database) and Help ID (from Help Topics database) are foreign keys

QUESTIONS

Question ID: VARCHAR(100)	Keywords: **VARCHAR(100)**	Questions: **VARCHAR(100)**	Help ID: **VARCHAR(100)**
QSTN8510	Account set-up	How do I upload my government-issued documents?	HLP0387
QSTN9827	Bank transfer, inter-bank transaction	How do I find the record of my previous transfer to BDO?	HLP4209

- Question ID is a primary key, Help ID is a foreign key (from Help Topics database)
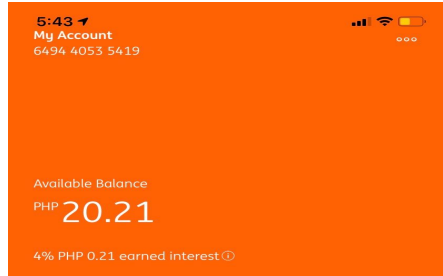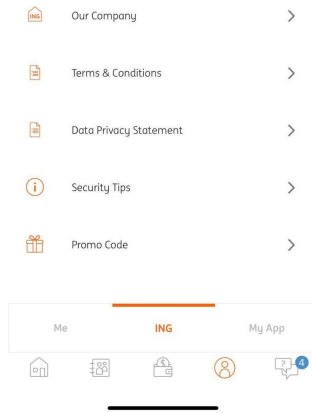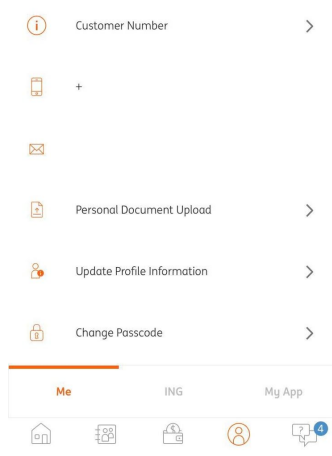
ANSWERS
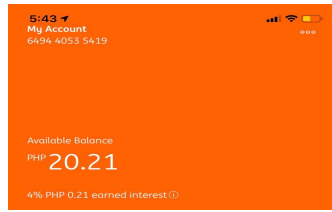
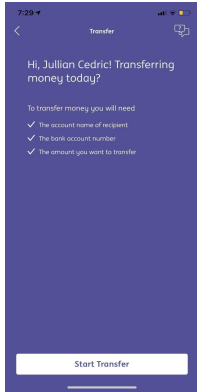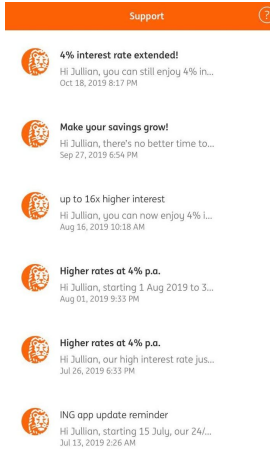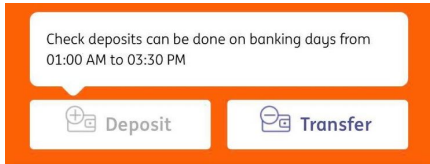| Answer ID: **VARCHAR(100)**	Keywords: **VARCHAR(100)**	Answer: **VARCHAR(100)**	Question ID: **VARCHAR(100)**
ANSR8510	Account set-up	Take a photo to scan your driver's license, passport, or any government verified document.	QSTN8510
ANSR9827	Bank transfer, inter-bank transaction	Refer to your transaction history under your account tab.	QSTN9827

- Answer ID is a primary key, Question ID is a foreign key (from Questions database)
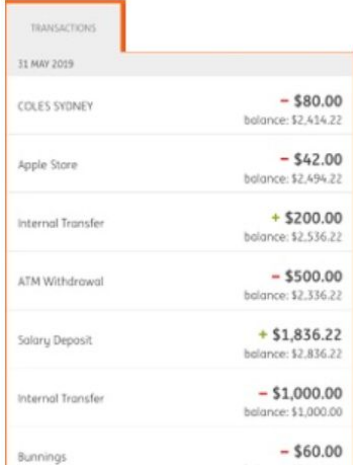
Analysis - Digital App Interface Design
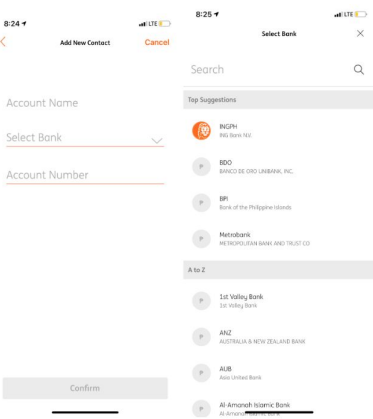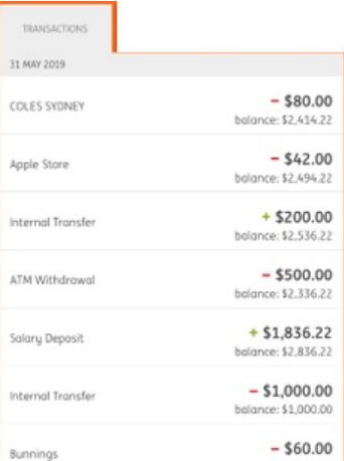
After analyzing the back-end current systems of ING, our attention was then brought towards the logical design of the forms and overall interface of the digital banking application. Here, we were able to find 15 guidelines that ING's digital banking application has followed to increase usability.

Guideline	Explanation	Proof/Demonstrations
1) Home Page Meaningful Title	The My Account title provides a meaningful title considering that it emphasizes the customer's specific account number. However, this aspect can still improve in being more meaningful through improvements in the emphasis on the details	

	provided.	
2) Home Page Meaningful Information	The information included on this page of the interface shows the immediate necessary information needed by the customer - his/her account balance, and account number.	
3) Balanced Layout for all pages	As seen from the user's point of view, the layout of the application is well balanced. The information given is shown to have adequate spacing and margin with clear labels. Each section is shown with an icon next to each label. Moreover, the background colors are simple so that it will be easier and more comfortable to look at when the app is in use by the customer.	
4) Easy Navigation System	In this case, the term navigation is used to describe the way the user is guided as he/she moves about within its different sections. As you can see from the app, it uses a left-to-right and top-to-bottom navigation. Each key and command is assigned to one function which makes it easier for the user to move about the app. Moreover, the key is highlighted in orange to indicate where you are currently.	
5) Highlighting Financial Information Using Bigger Font Size	The available balance of 20.21 pesos is highlighted because 20.21 is bigger than the text surrounding it. This makes it easier to identify the user's account balance.	
6) Highlighting Information Orange as a primary color	The ING Orange is able to accent an uninteresting display. Moreover, this color is able to establish an immediate relationship and association with ING as a whole. This then provides aesthetic to the current interface of the application. Other than this, the orange color was chosen by ING to foster vibrancy	

	and exhibit energy.	
7) Color Purple to contrast the Transfer transaction	Transfers are transactions wherein the user takes money out of their own account, and forwards it to another user. Given this, the color purple is used as a contrast to the typical colors orange and white, to highlight the difference of the transaction and to make the user take notice and be sure of what they are performing in the application.	
8) Highlighting Information Bold unread notifications	ING's support sends notifications to make announcements. Bold texts are often used to easily identify notifications that have not been opened by the user yet. This is to increase the sense of urgency and draw attention to a high priority new notification. Once the notifications have been clicked and opened, the weight of the text turns normal.	
9) Avoid usage of overly fancy fonts	As seen throughout the interface of ING's application, only simple font styles are used. The interface consistently utilizes an easily understandable font, so that users will not have a difficult time reading the texts inside the application.	Here you can save your contacts for easy transactions To add a contact you only need ✓ The name of the contact ✓ The name of the bank ✓ The bank account number
10) Highlighting Transaction Schedule Information	Aside from the action keys that are highlighted by being placed in a box, the check deposit schedule is also a piece of important information that users must take into consideration when placing their transactions. The scheduled information is placed within a speech bubble so that application users may easily notice the schedule for depositing checks.	Check deposits can be done on banking days from 01:00 AM to 03:30 PM ⊕ Deposit Transfer

11) All are Required Fields in the Sign Up Form	When customers sign up through the application, they must input all the important information requested by the application. All the fields in the signup form are required when creating an account for it to be verified for security measures and authentication. This serves as a control for the company to ensure that customers have no issues or problems, such as legal problems and the like. Aside from that, this also avoids the possibility of having null data, which would be deemed as a waste of storage space.	
12) Transaction Report Summary contains only 4 meaningful information - date, external party, finance amount increase or decrease, and effect on account balance.	The Transaction Report Summary only contains the necessary information that would translate to the user as the most vital details about the transaction. This is to avoid a cluttered interface that may include unnecessary information such as the account number of the contact, etc.	
13) Spacing of texts	Throughout the application, all texts are evenly spaced out to give users a better experience on viewing information as well as making it easier for them to read and understand the information provided on the interface. Double spacing is used for messages, while notifications have wider spacing from each other, as to give a clearer view of the data provided.	

14) Open-Ended and Closed-Ended Questions	The "Select Bank" dropdown provides a close-ended question since it only concerns partner banks, and contacts of non-partner banks cannot be kept. However, the account number and account name are considered to be open-ended where the user must input the data. These data are immediately redirected to the database of ING.	
15) Highlighting Alignment and Color of Finance Amount Increase (Green) and Decrease (Red)	The transaction report summary contains the financial amount that appears to have a green plus symbol when it increased, while displaying a color red minus sign if it decreases. Moreover, the numeric data follows the recommended alignment which is right-justified. With this, it will be easier for the user to identify and track the condition of its financial transactions.	

Overall Evaluation and Points of Improvement

ING Philippines currently employs good information systems and interface, that satisfies their strategy, goals, and requirements. However, our group has identified potential improvements in their systems and in their interface. For a more holistic view, perspectives are taken from the front-end as a consumer, and from the back-end as an employee.

Issues with the ING application interface

The UI UX of the application is actually well-made and is very usable. The transaction services are intuitive and ask for simple data that are expected for transactions to be made. The layout was structured well to allow transactions to quickly go through. However, a pain point and an opportunity identified is how improvements can still be made in the design guidelines of the onboarding forms, as it ultimately affects the onboarding experience, usability, and satisfaction.

First, instruction information was lacking. Before asking for inputs, there are 2 pages of instructions. However, neither of them states the need for a government-issued ID, pen and paper for the signature, TIN number, face verification, and 3-day verification before one can transact. This causes customers to discontinue to sign up, as they don't have the information readily available, or it leaves them frustrated as they cannot complete their transactions right away.

Second, the form was lengthy, and there was no feedback indication of how many steps were left in the process and what the sequence of the information is. Customer satisfaction tends to go down when they realize that they're more than 15 steps in already, and they are still unfinished. They then tend to leave the process and keep it unaccomplished. However, they are actually just a few steps away from completing the process, yet they potentially become a lost customer. Third, the drop-down menus of closed-ended questions were not apparent, and the fields indicating closed-ended questions were not consistent. Some users will see the questions

and would think that they won't have an answer for it. Knowing this, they assume that they won't be able to sign up and stop the onboarding process altogether. However, in the drop-down menu, there are pertinent choices, such as student in employment type. In addition, some closed-ended questions have "select" as the temporary text on the field, letting customers know that there are choices. However, some don't indicate "select", leaving customers to think that the field is an open-ended question.

Fourth, formats of the information are not specified. Some fields would be repetitive to fill up as there are certain answers that are not allowed. It would be helpful if requirements for these fields were specified already or if examples were given, to ensure that customers can get it right immediately. An example is the passcode.

Issues with Data Flow, Data Storage, and Static Information

First, since ING is a foreign bank, it has been hard to integrate its systems here. Abroad, having a single transactions data flow and data storage will suffice for many transactions. Despite certain fields varying between ING transactions and Non-ING transactions that cause multiple null data, this simplified setup can be supported because storage is not an issue for ING Global. However, in the Philippines, optimizing storage is one of the concerns of management because of low infrastructure quality, low data speed in the country and further issues to be delved into later on. With this being said, if null data exists, ING Philippines is wasting resources and effort to back these up and measures should be taken to further optimize the system.

Second, ING Philippines is different from ING Global in the sense that they put great priority in storing data from Non-ING transactions. Abroad, should there be Non-ING transaction data, the respective ING branches can simply ask other banks to share the information with them without having to keep copies of the data. However, in the Philippines, the BSP employs tougher information-sharing regulations between banks. With this, ING Philippines must keep its own database for the Non-ING transaction data to better operate. This heightens the need to optimize storage, as null data can actually be eating space that could've been used in building the database of Non-ING transactions.

Third, the Philippines is still prone to unexpected shutdowns of certain information systems. Because of this, companies then rely on their back-ups to operate. However, with low local storage space, it is not enough for both ING Transactions, and more pressingly, Non ING Transactions. As a result, backups are usually incomplete and the bank is temporarily paralyzed and unable to functionally operate.
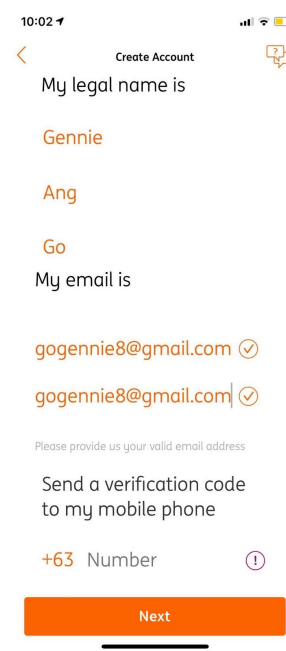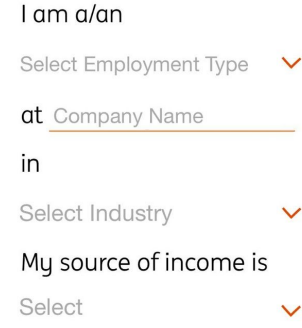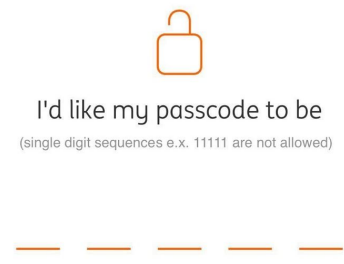
Fourth, support online through help topics tend to be static and unclear. Often, customer service assistants receive the same clarificatory inquiries and waste resources that could've been allocated to more pressing concerns that undeniably needs human assistance to complete.

<u>**Recommendations**</u>

In order to further optimize the ING application's system and interface here in the Philippines as it newly introduced, we propose 2 main recommendations.

Improve the UI UX of the mobile application by employing stricter guidelines

Guideline	Explanation	Samples
1) Add complete information in the instruction pages	One of the introductory pages should state that items like government-issued ID, pen and paper for the signature, TIN number, face verification, and a 3 day verification period are all needed prior to signing up. This ensures that the customer is ready with all the information needed to complete the entire onboarding process.	

2) Combine similar pages as the process is seemingly long	There are almost 13 pages you'll have to go through before you can successfully access the app and use its functions. Given this, we propose to combine name, email, and phone number into one page, and work, tax, and FATCA information into another in order to simplify the steps into 9 steps.	10:02 ⌐ ⚫⚫ 🔋 ‹ **Create Account** 💬 My legal name is Gennie Ang Go My email is gogennie8@gmail.com ⊘ gogennie8@gmail.com ⊘ Please provide us your valid email address Send a verification code to my mobile phone +63 Number ⚠ **Next**
3) Include headers and a guided map during the signup process	This guides the user as to which part of the process he or she is already in. Ultimately, preventing users from balking the process during onboarding.	‹ **Create Account** 💬 🔓 I'd like my passcode to be
4) Color highlight the dropdown menus so they can be seen clearly by the users, and create a consistent field input such as "select _____" to clarify that it is a drop-down menu.	Consistency in fields and color highlighting makes it easy to identify close-ended questions. Evidently, this also allows users to be more confident in their answers, as well as provide distinct data sets for ING.	I am a/an Select Employment Type ⌄ at Company Name in Select Industry ⌄ My source of income is Select ⌄
5) Formatting information should be specified	Ensures correct answers are inputted and avoids inefficiencies in inputting the wrong field data	🔓 I'd like my passcode to be (single digit sequences e.x. 11111 are not allowed) — — — — —

Segregate ING and Non-ING Database and Link Help Topics with Employees

Entity	Primary Key	Explanation
ING Transaction	Transaction_ID	• Transactions are done between ING accounts. • Depositing and transferring are the current sending and receiving transactional processes. • Mandatory cardinality in relation to transactions and account since an account is mandatory to engage in transactions • Account can engage in multiple transactions.
Interbank Transaction	Transaction_ID	• Transactions can also be done between and ING account and another bank. • Similarly, depositing and transferring are the current sending and receiving transactional processes between other banks. • Account can engage in multiple interbank transactions.

In the proposed improvements, one of the main changes is the splitting of transactions based on its subtype, on whether the bank accounts used in the transaction are both from ING or if one of the bank accounts is from a different bank. In the original diagram, null data is generated regardless of where the bank account originates. The generation of null data wastes memory space and creates additional unnecessary data that ultimately complicates the system. By separating the transactions into subtypes in the new system, data will be easier to both store and handle since the unnecessary null data has already been removed. Three benefits can be derived:

First - it eliminates null data present in the transactions process. By eliminating the null data, ING will be able to free up more data storage space for them to use for other more important information.

Second - it allows ING Philippines to build its local database of Non-ING Bank data. This is very important for ING since banks in the Philippines do not share data as freely as other banks globally. Also, since the Philippines will eventually implement the requirement to have a local database, it would be best for ING to already have a head start.

Third - allows a more focused local back-up. Since ING transactions and Non-ING transactions are separated, ING Transactions can be stored in the cloud system of ING as it is internal information that may even be useful globally. This then leaves much room for Non-ING transactions to be backed-up locally, since it is only local that use for the data. In case of system failures and errors where ING needs to use back-up information, they can tap both the cloud and physical backups to have complete information. This also allows ING to better adapt to the country's information landscape and also have easier access to important data.

Another improvement is linking the help topics to employees. Currently, ING only has static information that is seldom changed. By linking the help topics to employees, the information can be transformed into dynamic, wherein the information can be constantly updated by customer service assistants. A data storage of common questions may be implemented to further improve on the help topics, especially because ING is new and emerging in the digital space. Another improvement is improving the quality of the entity. The system is deemed to be undermanned so it is recommended to increase the number of employees to better handle not just the accounts but also the help topics.

Conclusion and Implementation

To summarize, our pain point primarily targets how ING systems adopted from overseas and prototyped here are incoherent for the Philippine market. Regulations deemed to be different, database needs are contrasting, employee expertise is lacking, and there are still improvements that can be made as to the user experience of the app itself.

We set out to make the systems more pertinent yet still simple for all stakeholders. Through our 3 solutions, first separating the database for ING transactions and Non-ING transactions, linking help topics with employees, and improving the app interface to further follow good design guidelines, we can exactly do that. Information is better segregated, we don't store null data sets, we create a database of non-ing transactions dedicated for the Philippines, backing up files can be more specialized, processing information can be done faster even with less-skilled employees, information communicated through the app can easily be changed and made more dynamic, and users have a better overall design satisfaction preventing them from deterring their use of the app.

These are just some of the benefits our solutions can provide, and we believe that it can help ING's digital banking in its early stages here in the country, and even prime it for further expansion. As for implementation, our contact mentioned that our basic outlook on ING's systems is intact. If they are indeed correct upon further analysis, his team can meet with their respective IT counterparts and management to get their respective buy-ins, and subsequently improve on our idea. Multiple iterations of the suggested designs will be made first before a go-signal is given to in-house developers to begin prototyping and to translate the designs into developed information systems.

Overall, this report as an output has successfully formalized and organized the current basic information systems that ING Philippines have in place, and have highlighted potential room for growth based on the company's requirements and possible courses of action. By taking advantage of the slightest improvements that can provide competitive advantage as early as now, ING may extract more success from their current services and their planned expansions in the future. Although the proposed improvements may be perceived as small, as ING Philippines is a large growing company, these improvements may definitely have huge and practical effects to the company's desired success.

Appendix

Interview Transcript

Interviewer: Hi. We're doing a study on the information flow of the app of ING, and how employees think the system and processes can still be improved. We've decided to be focusing on the on boarding process where new customers sign-up.

Improvement can come in any form - like acquisition of information, or improvement in processing, or automating any process.

APP RELATED QUESTIONS
1. What processes do you currently employ in the on boarding process of the application? (e.x. how do you receive information, once you receive a certain information - what do you do with it after, etc.)

Interviewee: In the onboarding process, we further verify the information inputted by the user. The process will take approximately 3-5 working days. Other information such as Terms and Conditions Acceptance are automatically verified in the systems of ING. While others such as ID, birth information, legal name are manually verified by us.

2. What processes does on-boarding do well in?

Interviewee: The on-boarding guides the users on how to answer the questions, like how there are certain questions that ING has provided the users with answers to choose from, such as employment etc. Also our verification system only needs a few requirements which is why it takes up a shorter time than the usual to accomplish.

3. What processes can on-boarding improve in? What are its current problems?

Interviewee: The current on-boarding process seems very long and draggy when in reality, it should be pretty simple for the users. Aside from that, although the verification of the information should in theory take only a few days, in reality takes longer than expected since we have to make sure that the people who will be using the app are authorized to transact.

4. What system improvements do you think are needed in the current process, and why? You may opt to identify major problems only or those that you feel are actionable.

Interviewee: I think that the on-boarding could be made a lot easier and shorter for the users, and also make them aware of the requirements we'll be needing for the process. Also the verification lead time could be shortened, since there are cases when it actually takes a week or more to verify the information of the user.

5. What certain functions or attributes do you want the system to have (even if it's not so realistic).

Interviewee: Maybe for it to have more guides for the user, also clearer instructions and requirements. Also if there could be a way to make the interface more pleasing to the user and a little less boring.

Interviewer: For the following questions, we hope to get a better understanding of the individual employees who interact with the information received from the ING application. Please answer the following with the restraint of information only related to the application

GENERAL QUESTIONS:

1. What is your position?

Interviewee: I'm currently the Product Owner for Savings

2. What entities do you interact with? Entities being people, data/information, software, and processes?

Interviewee: I interact with different entities, like other employees, the data needed for a specific function, the different softwares we use for our deliverables such as ARIS and DevOps. But other than this, generally, I interact with the customer, bank account, transaction, and the like.

3. What are the key attributes (unique noun) of these entities? (E.x. for people - their first name, for government ID - the ID number, etc.)

Interviewee: For the customer, we use their whole name, as stated in their government issued ID. Unique numbers are then assigned for the transaction done, together with the bank accounts involved in the transaction.

4. How do you interact with these entities? How do these entities interact with each other? (For Information entities, please specify the inputs and outputs)

Interviewee: I interact with these entities depending on the type of entity I'm interacting with. For example, in terms of employees, I interact with them through setting meetings with the team. However, in terms of customer and transactions, currently, there are assigned employee entities to make sure that the transactions done are valid.

5. How many times do you interact with each other?

Interviewee: We interact with each other on a daily basis.

6. What are the mandatory interactions?

Interviewee: In my opinion, interactions with all entities are considered to be mandatory. This is essential in ensuring the efficiency and accuracy of the transactions.

7. What are the optional interactions?

Interviewee: There aren't any optional interactions since, as product owners, it's vital that we are aware of what's happening with each entity.

8. Do these entities have subtypes? What are they? (e.x. Type of Entity: People - Subtype: Employee - SubtypeSubtype: Manager, Assistant Manager)

Interviewee: Transaction entities are the more important ones that we assigned subtypes, which would refer to which bank is involved in the transaction - it can either be an interbank transaction or an ING transaction. However, other entities such as employees have different subtypes as well.

9. Can a person be 2 subtypes at once?

Interviewee: We don't give much importance to the other entities, since they are not as relevant to the systems and operations. Although, as far as we're concerned, we make sure that each person can only possess one subtype at a time.

QUESTIONS ON TOOLS:
1. What types of system information tools do you use in the office? (MS Word, MS Excel, MS PPTX, MS Outlook, CS50, Photoshop, ING's own systems)

Interviewee: We use the usual MS Office functions like Word, Excel, Powerpoint, and Outlook. Other employees, like me, use ARIS and DevOps for our functions. Other functions also have tools that are specifically for their tasks. ING also has a local data storage backup that we use which is outside of the Global ING database.

2. What do you use these tools for?

Interviewee: We use Word, Excel and Powerpoint for the requirements needed in the office, while Outlook to set meetings and relay information among everyone. As mentioned, some functions have specific tools that they use and then most of the important information that we store and process goes to the local ING backup.

3. Do these tools satisfy what you need?

Interviewee: For the most part, these tools are able to help with the day-to-day needs in the office. The data storage, on the other hand, may not be enough when there would be emergencies and problems with the main tools and data. When the main database crashes, I wouldn't know if the local backup database would be enough.

4. If any improvement can be made with these systems/tools (automation), what would they be?

Interviewee: It would be great to look into other options for managing the data storage. Since ING handles a lot of data and processing these, the current local backups may not be sufficient when the main tools crash from the volume of the data.

DFD Diagrams

Level 0
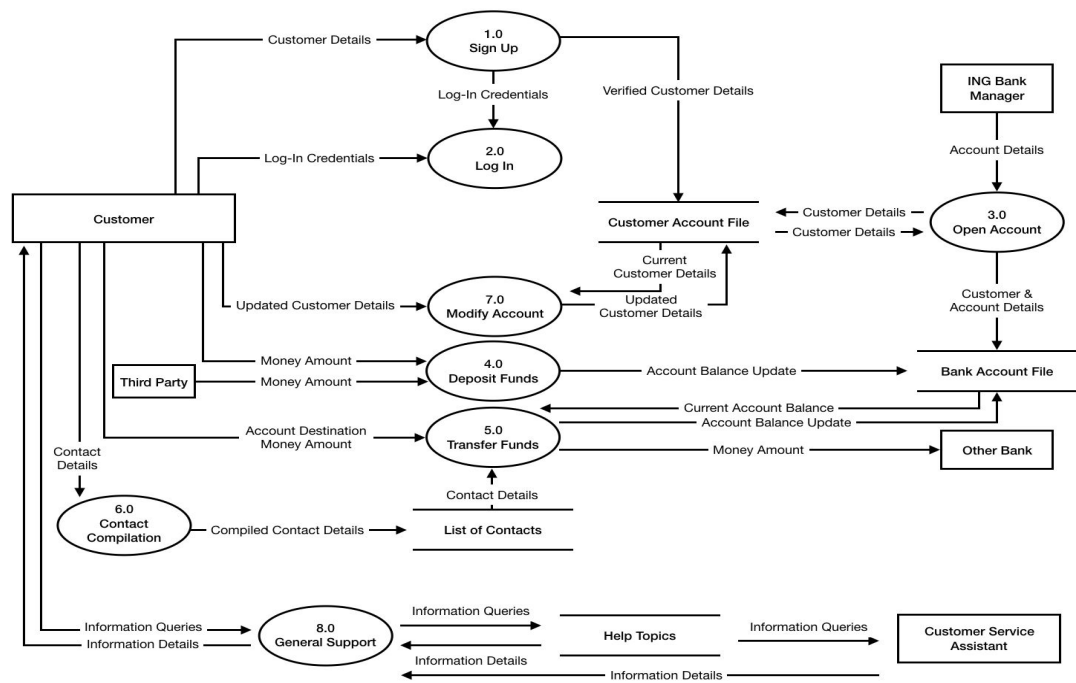
Level 1

Level 2

E-R Diagram

CONTACT

PK	Contact ID
	Bank Name
	Account Number
	Name

Owned by

Has

CUSTOMER

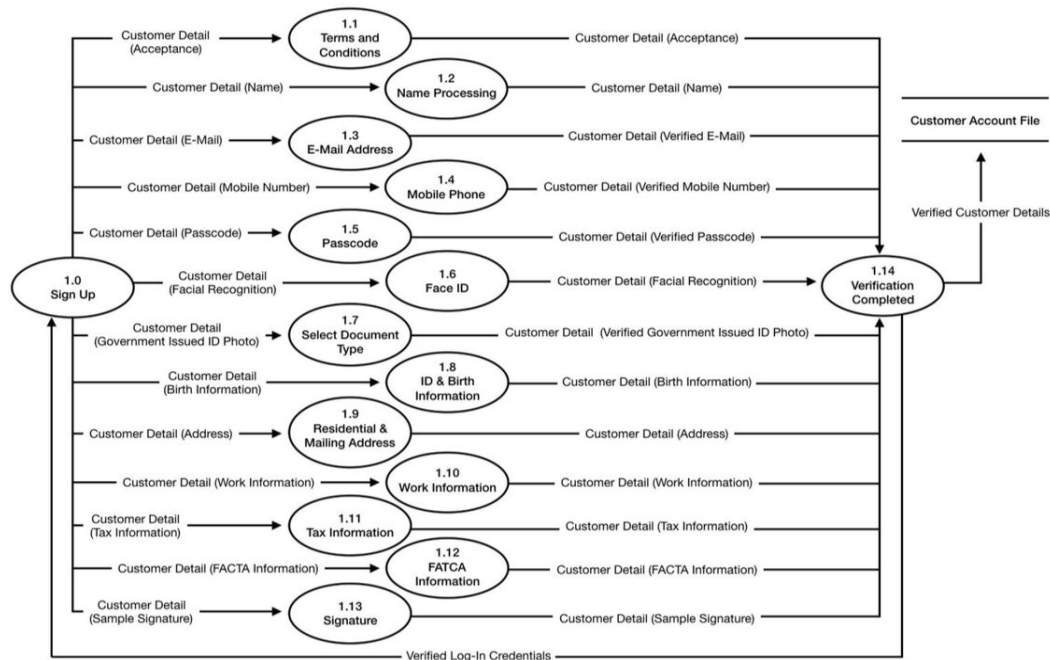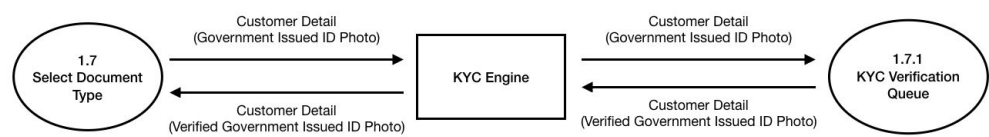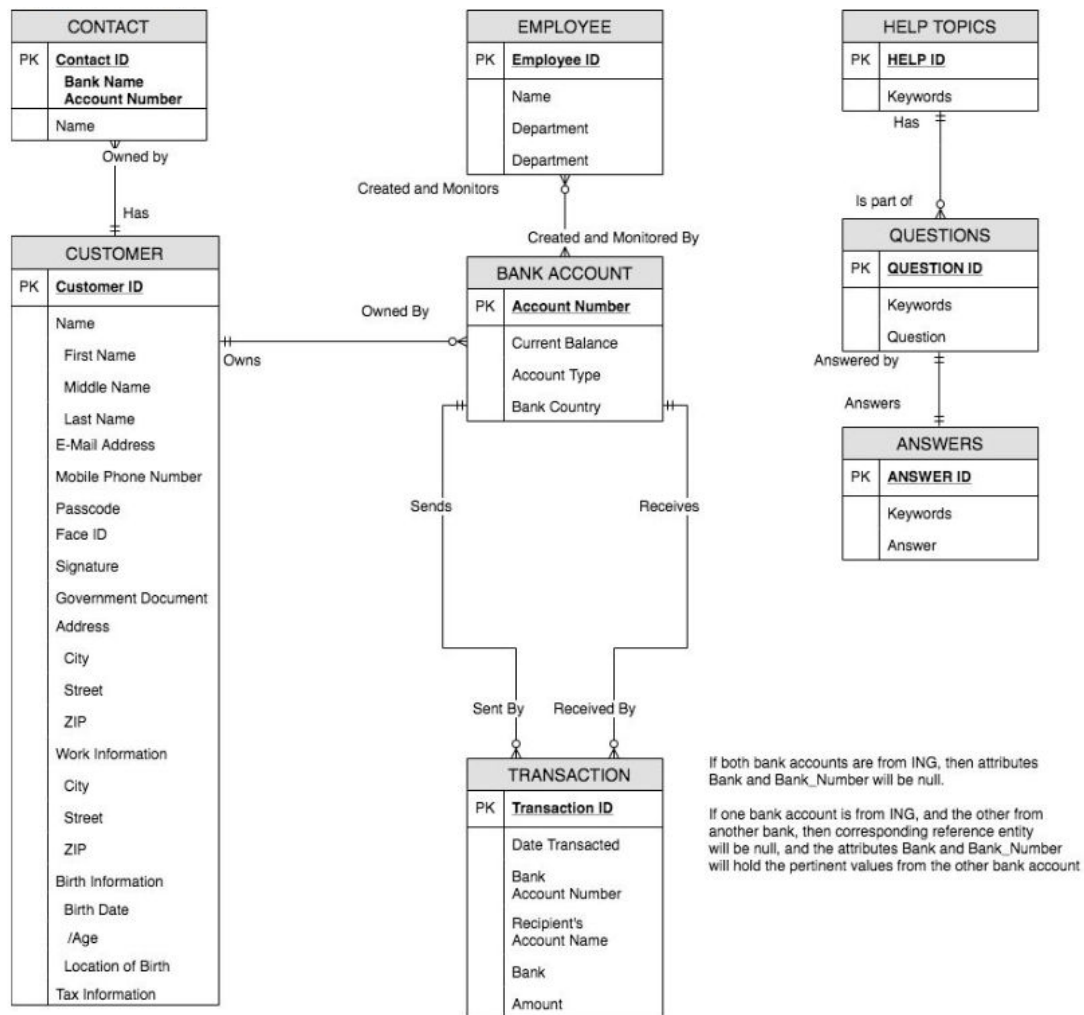| PK	Customer ID
	Name
	First Name
	Middle Name
	Last Name
	E-Mail Address
	Mobile Phone Number
	Passcode
	Face ID
	Signature
	Government Document
	Address
	City
	Street
	ZIP
	Work Information
	City
	Street
	ZIP
	Birth Information
	Birth Date
	/Age
	Location of Birth
	Tax Information

Owns

Owned By

EMPLOYEE

PK	Employee ID
	Name
	Department
	Department

Created and Monitors

Created and Monitored By

BANK ACCOUNT

PK	Account Number
	Current Balance
	Account Type
	Bank Country

Sends

Receives

Sent By   Received By

TRANSACTION

PK	Transaction ID
	Date Transacted
	Bank
	Account Number
	Recipient's Account Name
	Bank
	Amount

HELP TOPICS

PK	HELP ID
	Keywords

Has

Is part of

QUESTIONS

PK	QUESTION ID
	Keywords
	Question

Answered by

Answers

ANSWERS

PK	ANSWER ID
	Keywords
	Answer

If both bank accounts are from ING, then attributes Bank and Bank_Number will be null.

If one bank account is from ING, and the other from another bank, then corresponding reference entity will be null, and the attributes Bank and Bank_Number will hold the pertinent values from the other bank account

Proposed E-R Diagram