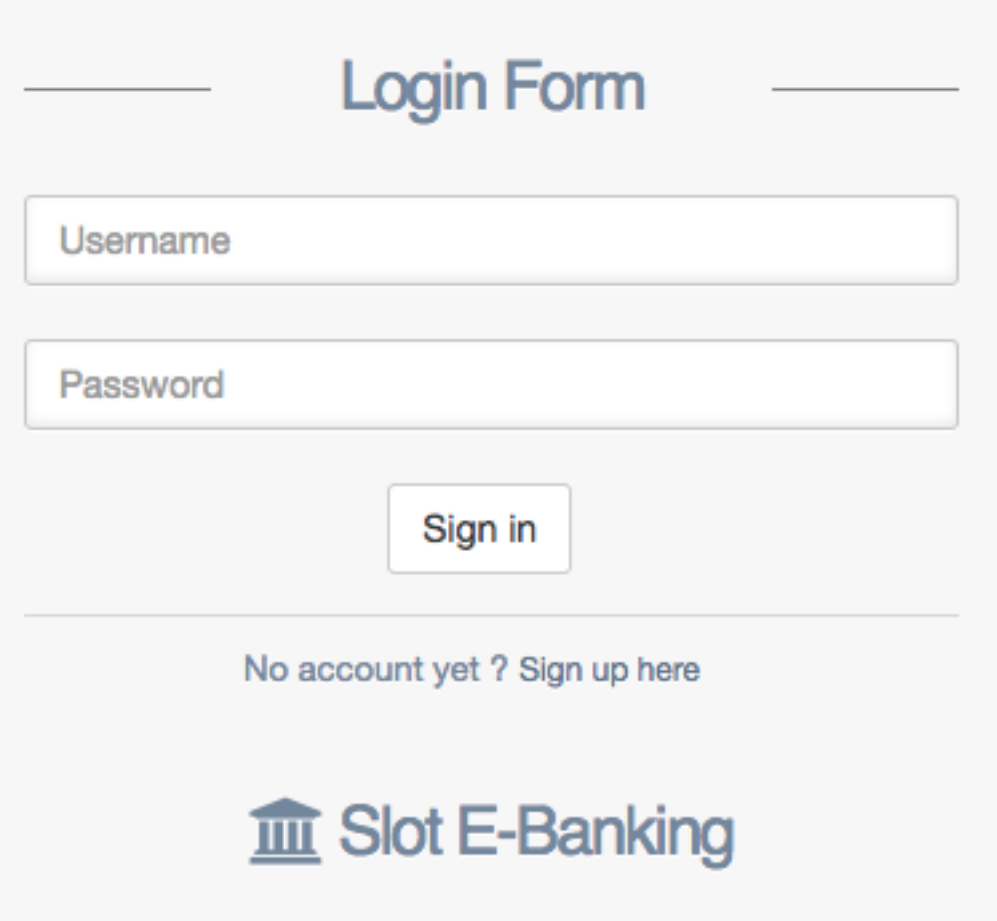
Online Banking System Database Design

A complete Banking System Design

December 7, 2559 BE



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Introduction

There is no denial that technology make huge impact on our lifestyle. We use technology for socialize with our friend and family, make transaction for our business and online bill payment. As a computer engineering major, we felt the meaningful impact that these technologies create, its complexity amaze us. We felt like it's our duty as a next generation engineer to understand and improve these technologies. At the core of these technology are the language that created it. And when it comes to web application, PHP, HTML and JavaScript is the language that make web application possible.

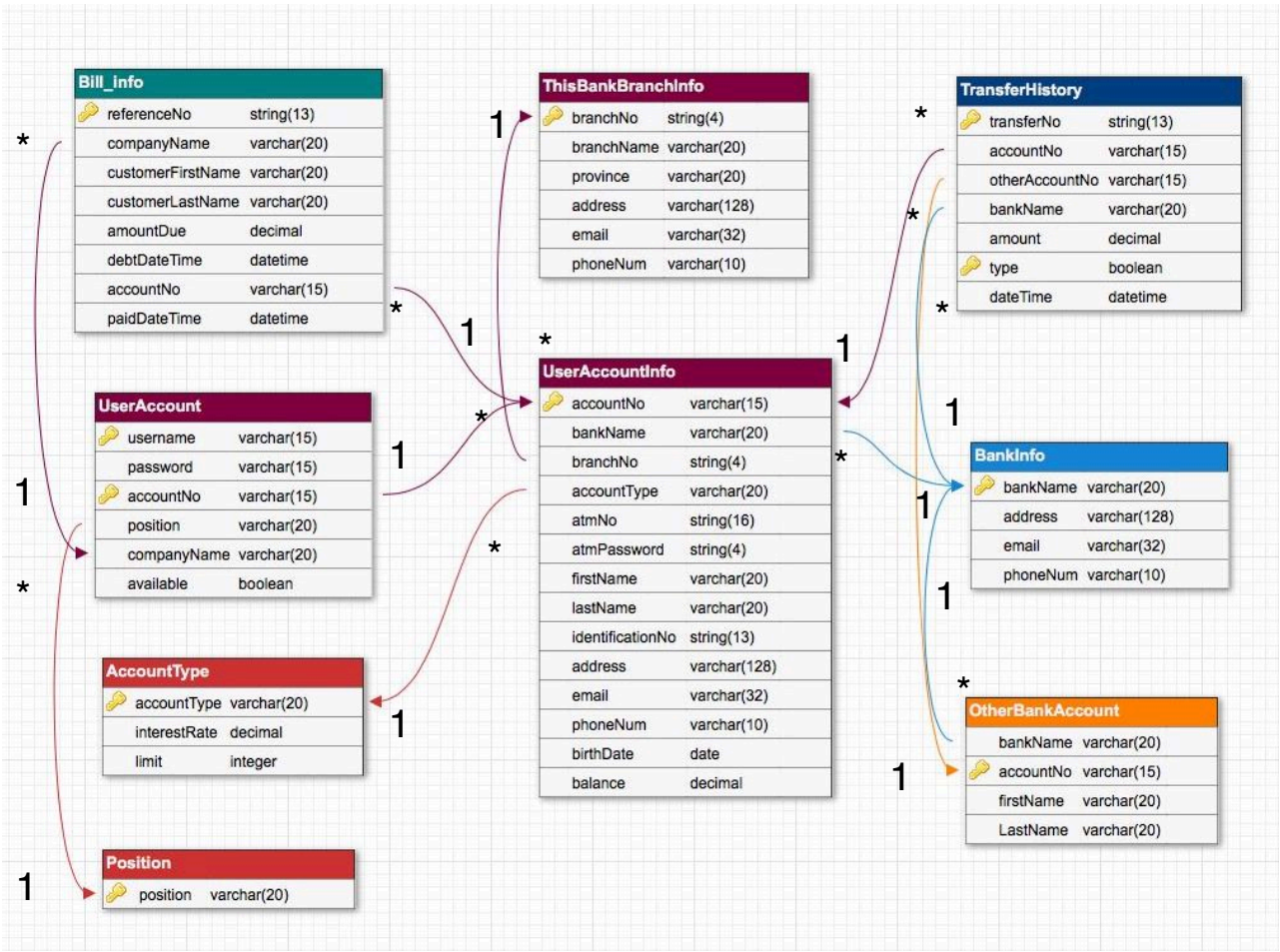
PHP is a server-side scripting language designed primarily for web development but also used as a general-purpose programming language. PHP originally stood for Personal Home Page, but it now stands for the recursive acronym PHP: Hypertext Preprocessor[1].

HyperText Markup Language (HTML) is the standard markup language for creating web pages and web applications. With JavaScript, it forms a triad of cornerstone technologies for the World Wide Web. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

JavaScript is a high-level, dynamic, untyped, and interpreted programming language. It has been standardized in the ECMAScript language specification. JavaScript is one of the core technologies of World Wide Web content production; the majority of websites employ it, and all modern Web browsers support it without the need for plug-ins[2].

Our group use existing technology to design online banking system database. While we were exploring the world of web application, we found each language capability and limitation. But together, they form high performance system that be use to implement for almost any web application any developer desired. However, for the scope of this project we couldn't implement the security feature in this design.

ER diagram



1: One relationship, *: Many Relationship

UserAccount one to many Bill_Info.

Position one to many UserAccount.

UserAccountInfo one to many Bill_Info.

UserAccount one to many UserAccountInfo.

AccountType one to many UserAccountInfo.

ThisBankBranchInfo one to many UserAccountInfo.

UserAccountInfo one to many TransferHistory.

BankInfo one to many UserAccountInfo.

BankInfo one to many TransferHistory.

BankInfo one to many OtherBankAccount.

OtherBankAccount one to many TransferHistory.

Data Dictionary

Entity Name	Attributes	Description	Data type & Length	Can be null?	Key
AccountType	accountType	Type of bank account	varchar(20)	No	Yes(PRI)
	interestRate	Interest rate per year	decimal(12,2)	No	No
	Limit	Maximum Money in account	int(11)	Yes	No
BankInfo	bankName	Name of the bank	varchar(20)	No	Yes(PRI)
	address	Address of the bank	varchar(128)	No	No
	Email	Email of the bank	varchar(32)	No	No
	phoneNum	Phone number of the bank	varchar(10)	No	No
Bill_Info	referenceNo	Reference Number of the bill	varchar(13)	No	Yes(PRI)
	companyName	Company's name that issue the bill	varchar(20)	No	Yes(REF)
	customerFirstName	First name of the customer	varchar(20)	No	No
	customerLastName	Last name of the customer	varchar(20)	No	No
	amountDue	Amount that customer need to pay	decimal(12,2)	No	No
	deptDateTime	Time the company issue the bill	dateTime	No	No
	accountNo	Account number that paid the bill	varchar(15)	Yes	Yes(REF)
	paidDateTime	Time that customer paid the bill	dateTime	Yes	No
OtherBankAccount	bankName	Name of the bank	varchar(20)	No	Yes(REF)

Entity Name	Attributes	Description	Data type & Length	Can be null?	Key
	accountNo	Customer's account number	varchar(15)	No	Yes(PRI)
	firstName	Customer's first name	varchar(20)	No	No
	LastName	Customer's last name	varchar(20)	No	No
Position	position	User's position in bank	varchar(20)	No	Yes(PRI)
ThisBankBranchInfo	branchNo	Branch number of the bank	char(4)	No	Yes(PRI)
	branchName	Branch name of the bank	varchar(20)	No	No
	province	Province of the bank	varchar(20)	No	No
	address	Address of the bank	varchar(128)	No	No
	email	Email of the bank	varchar(32)	No	No
	phoneNum	Phone number of the bank	varchar(10)	No	No
TransferHistory	transferNo	Customer's transfer number	int(13)	No	Yes(PRI)
	accountNo	Customer's account number	varchar(15)	Yes	Yes(REF)
	otherAccountNo	Customer's other bank account number	varchar(15)	Yes	Yes(REF)
	bankName	Name of the bank	varchar(20)	No	Yes(REF)
	amount	Amount transfer	decimal(12,2)	No	No
	type	Type of transfer	tinyint(1)	No	No
	dateTime	Time of the transaction	dateTime	No	No
UserAccount	username	Username of the customer	varchar(15)	No	Yes(PRI)
	Password	Password of customer's account	varchar(15)	No	No

Entity Name	Attributes	Description	Data type & Length	Can be null?	Key
	accountNo	Customer's account number	varchar(15)	No	Yes(PRI)(REF)
	Position	Customer's position in bank	varchar(20)	No	Yes(REF)
	companyName	Customer's company name	varchar(20)	Yes	Yes(Unique)
	Available	Customer's statue	tinyint(1)	No	No
UserAccountInfo	accountNo	Customer's account number	varchar(15)	No	Yes(PRI)
	bankName	Name of the bank	varchar(20)	No	Yes(REF)
	branchNo	Branch number of the bank	char(4)	No	Yes(REF)
	accountType	Customer's account type	varchar(20)	No	Yes(REF)
	atmNo	Customer's atm number	varchar(16)	Yes	No
	atmPassword	Customer's atm password	char(4)	Yes	No
	firstName	Customer's first name	varchar(20)	No	No
	lastName	Customer's last name	varchar(20)	No	No
	identificationNo	Customer's identification number	char(13)	No	No
	Address	Customer's address	varchar(128)	No	No
	email	Customer's email	varchar(32)	No	No
	phoneNum	Customer's phone number	varchar(10)	No	No
	birthDate	Customer's birthdate	date	No	No
	Balance	Customer's account balance	decimal(12,2)	No	No

User Roles

Client

- Register the account and fill the form (**INSERT to UserAccount**)
- User can have multiple accounts (**INSERT to UserAccountInfo,UserAccount**)
- Check Current balance(**VIEW balance from UserAccountInfo which accountNo of user is matched**)
- Check history transaction(**VIEW TransferHistory which accountNo of user is matched**)
- Transfer Money to others(same bank) account (**INSERT to TransferHistory and Update balance in UserAccountInfo**)
- Can transfer money to another bank but the receiver account must be in table OtherBankAccount.
- Pay Bill online (**Update Bill_info , Update balance in UserAccountInfo and VIEW TransferHistory**)

Company

- Can act as Client.
- Manage bills such as **INSERT, UPDATE, DELETE, VIEW in table Bill_info**
- Check whether Client paid the bill.

Administrator

- Can act as Client.
- Manage Client Account such as

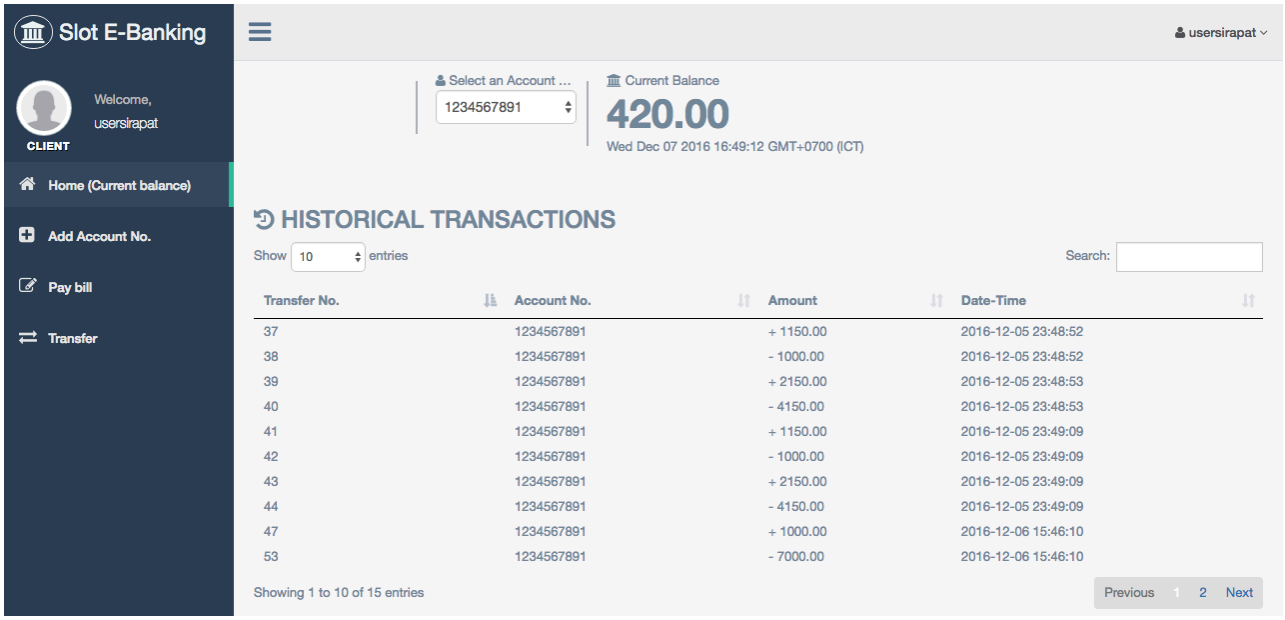
VIEW UserAccount / UserAccountInfo / TransferHistory

DELETE UserAccount / UserAccountInfo / TransactionHistory

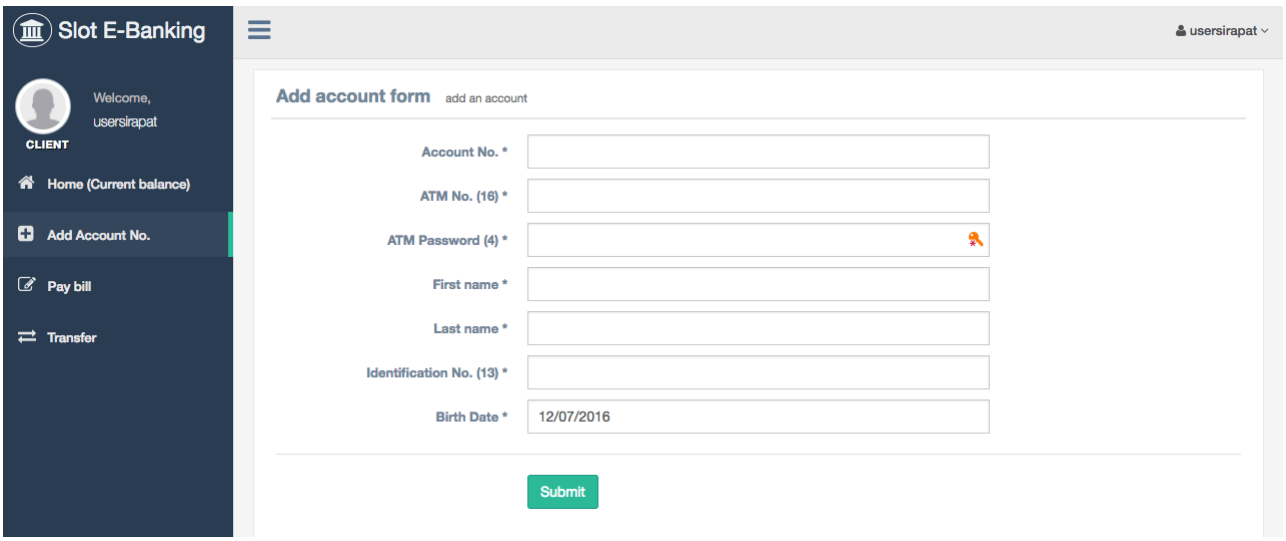
UPDATE UserAccount / UserAccountInfo

Feature

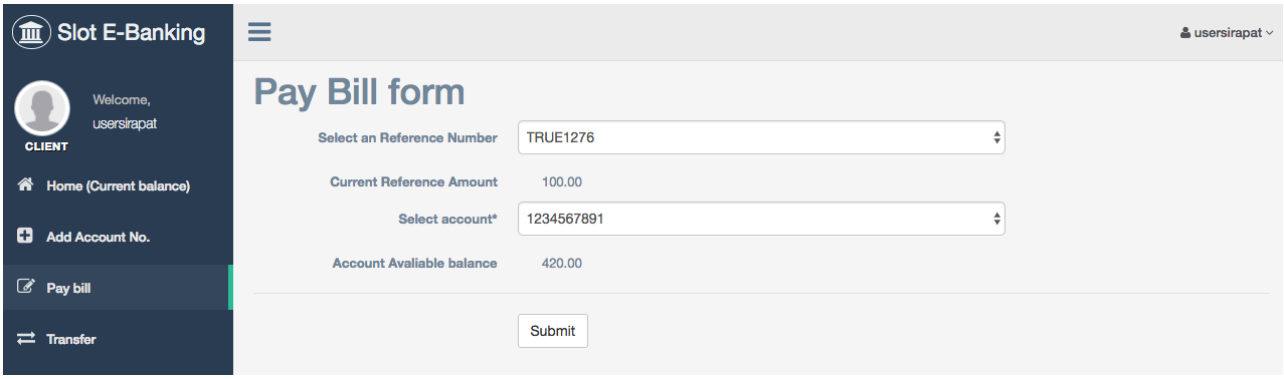
Client Perspective



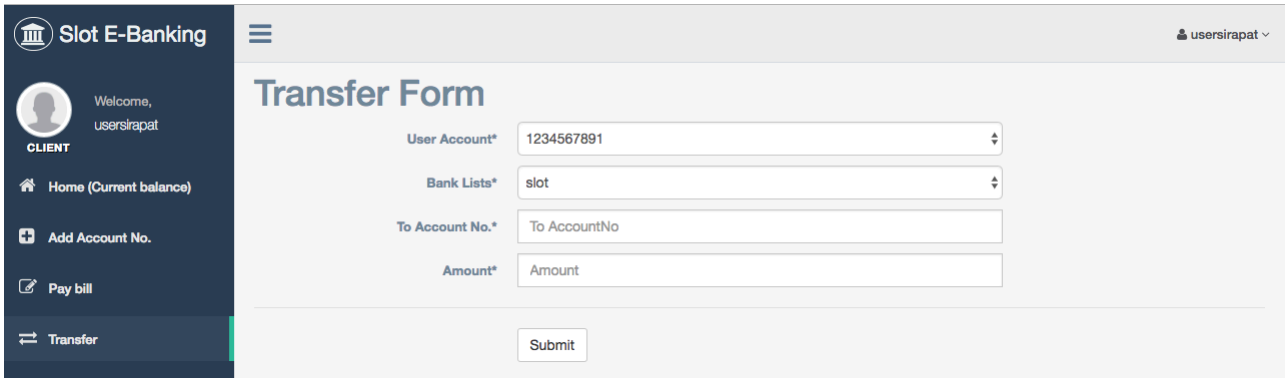
- Account Number query from UserAccount.
- Current Balance query from UserAccountInfo.
- History Transactions query from TransferHistory.



- Add account form will insert additional account to UserAccount Table.

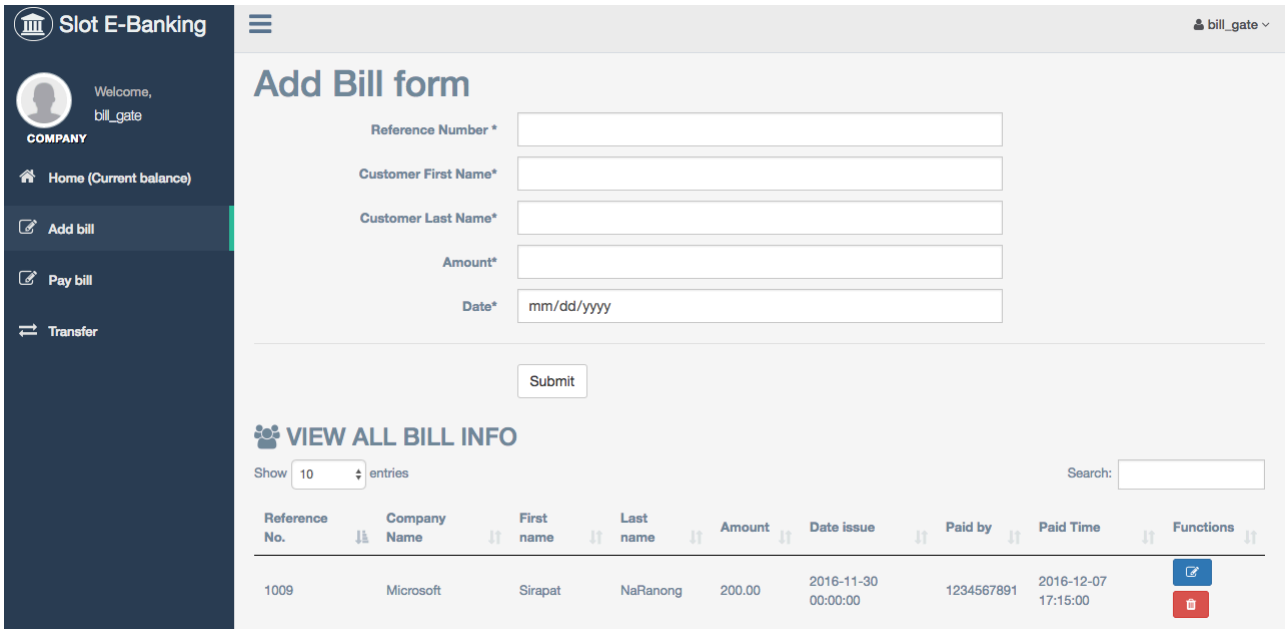


- Pay Bill Form will check reference number in Bill_Info for Bill status. The dropdown menu will query the value that the accountNo is null, indicate unpaid bill. After select dropdown reference number, javascript will update debt amount. Account Dropdown menu will query accountNo from UserAccountInfo where user is currentUser. When summit, the form will update balance in UserAccountInfo, insert into TransferHistory, and update Bill_Info.



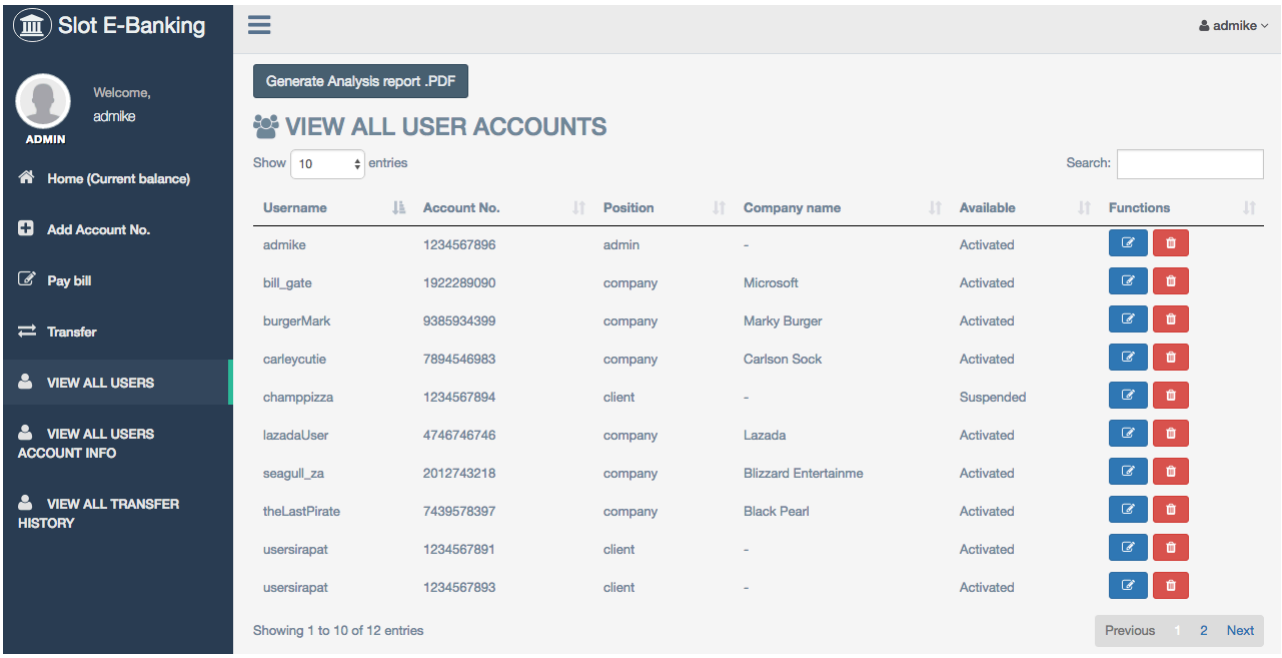
- Transfer Form query accountNo from UserAccountInfo where user is currentUser, query bankName from BankInfo. After user submit the form, the javascript and php will check fit designated accountNo exist or not. Then the system will check for the transfer amount, if user transfer more than current balance. The error will occur. If everything go correctly, the system will update balance in UserAccountInfo, insert into TransferHistory.

Company Perspective

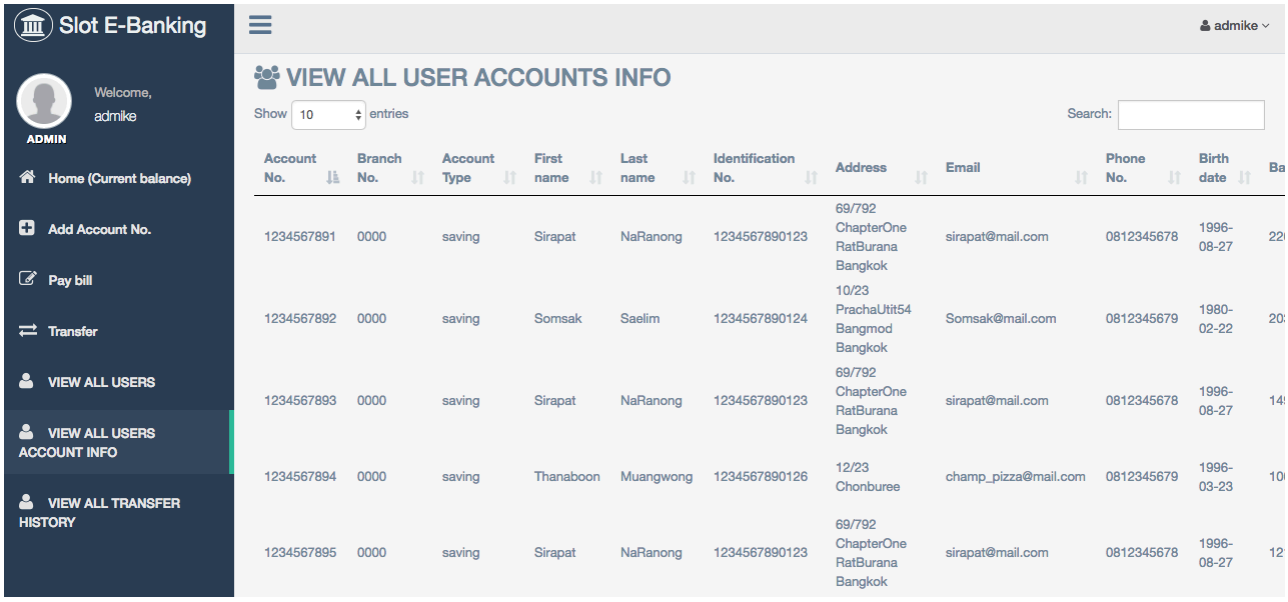


- View All Bill Info query from Bill_info. After user summit the form, it will check the uniqueness of reference number. If reference number is duplicate, the error will occur. If all data is correct, the system will insert into Bill_info.

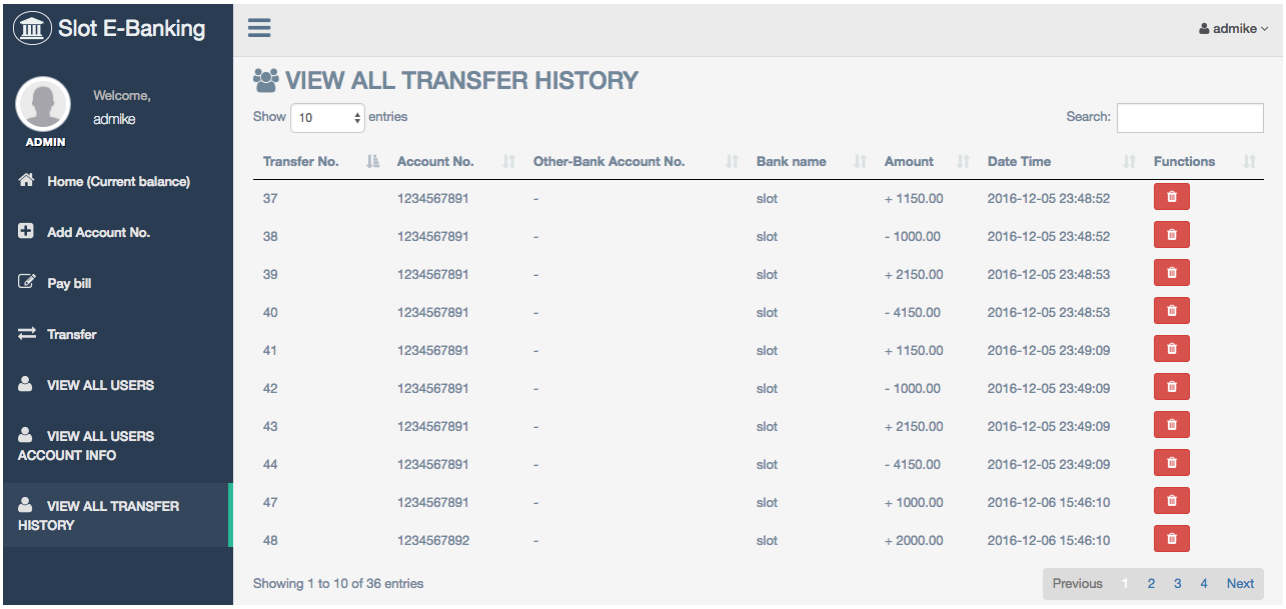
Administration Perspective



- View All User Accounts query from UserAccount. Administration can delete, edit and suspend any UserAccount.



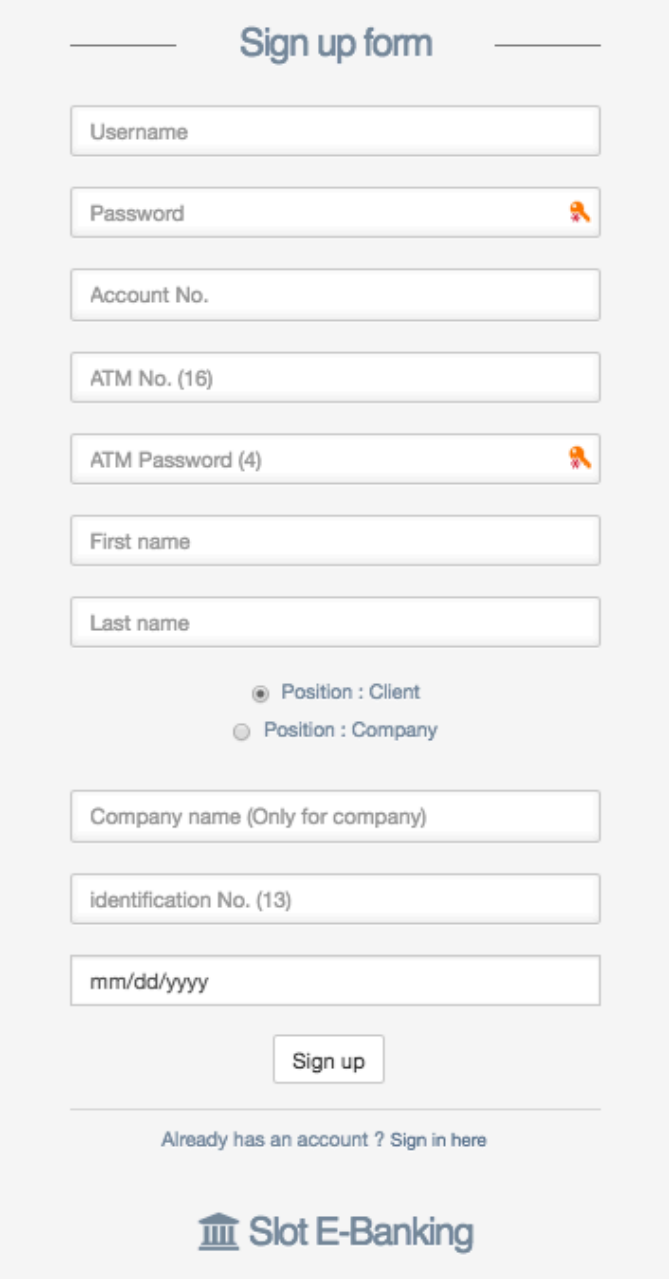
- View All User Accounts Info query from UserAccountInfo. Administration can delete, edit any user account information.



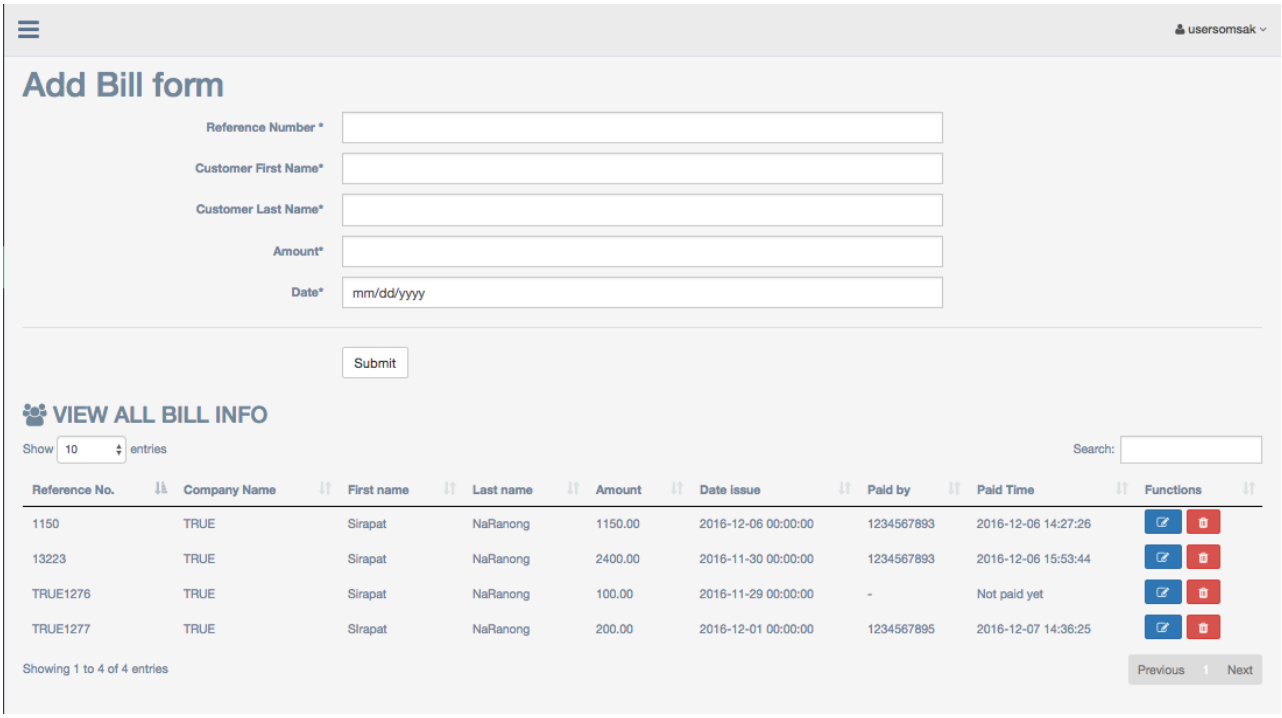
- View All Transfer History query from TransferHistory. Administration can delete any transfer history for any user account.

Complex Form

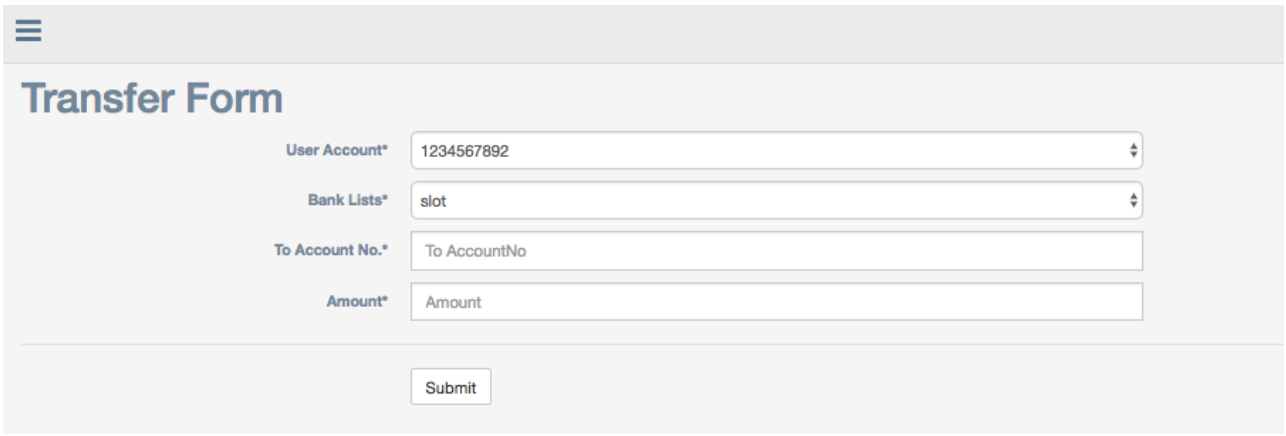
User Registration



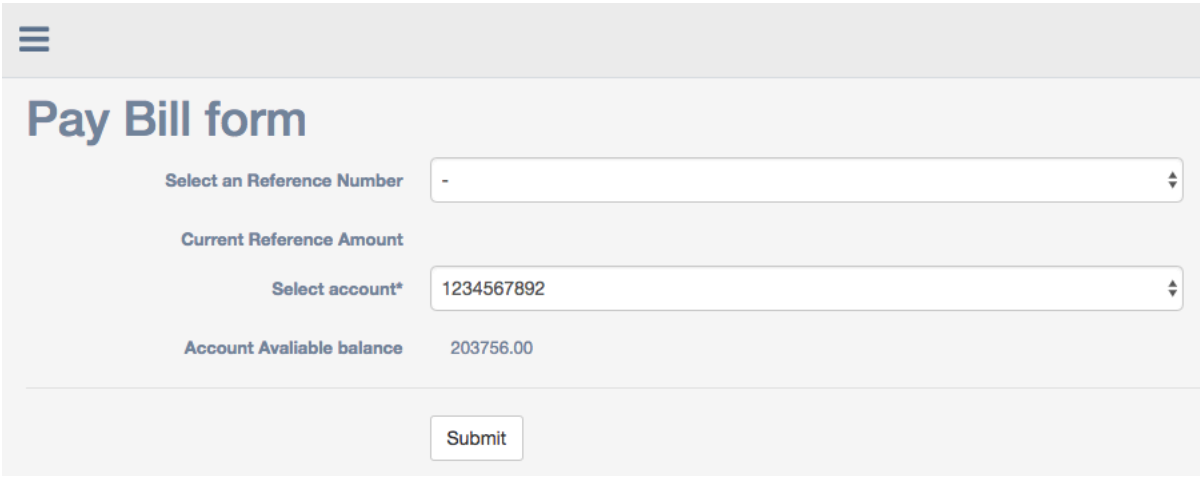
Company Add Bill Information



Client Transfer Form

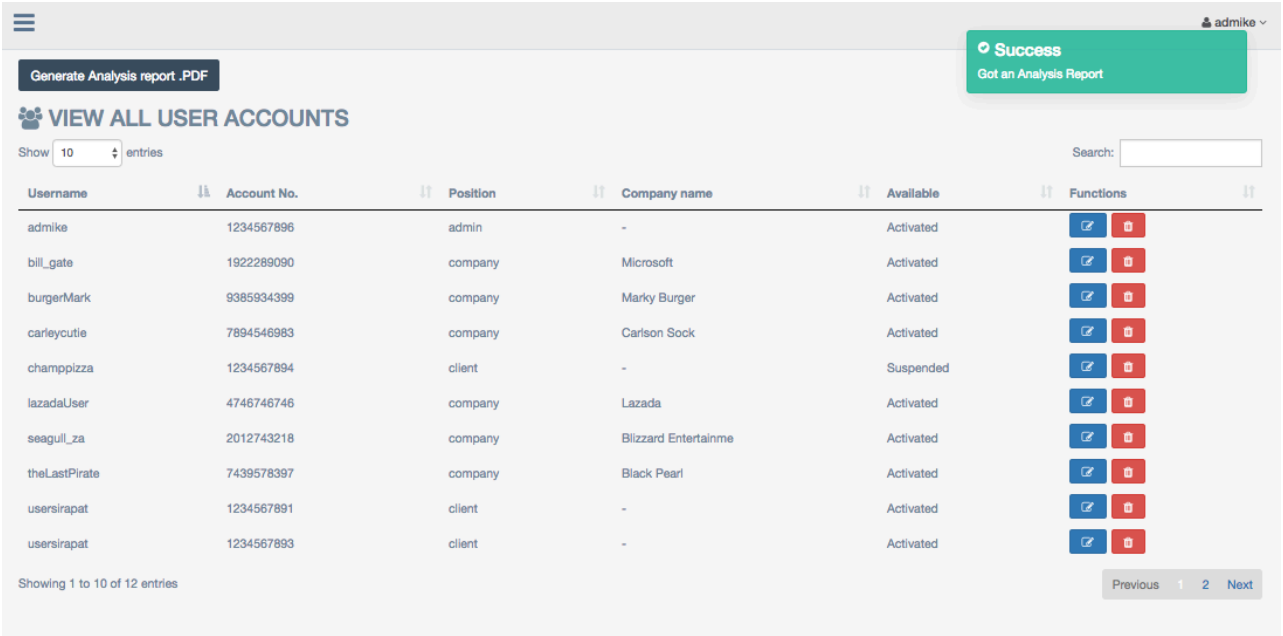


Pay bill Form



Analysis Report

We already provide an easy way for admin to generate analysis report through JsPDF API.



The API feature allow us to generate analysis report in pdf file.

Analysis Report for ADMIN

This file is generated from ANALYSIS REPORT FUNCTION
in ADMIN VIEW ALL USERS page using a Javascript library

1. Total number of account in the system = 12
2. Number of Company in the system = 7
3. Number of Client in the system = 4
4. Average balance of all account = 1737578.895833
5. Highest balance of all account = 10000000.00
6. Lowest balance of all account = 85.00
7. Account type with maximum interest rate = interest
8. Highest amount of Transfer/Pay bill = 9000.00
9. Total number of money in this bank = 20850946.75

Web Implementation

Languages

- HTML/Javascript/PHP/SQL

Technologies / libraries

- **Bootstrap** : create nice user interface
- **JQuery** : a javascript library that we use to control the request from client-side (HTML) and response from server-side (PHP)
- **DataTable** : create powerful tables.
- **PushBullet** : an API we used to notify to every connected devices (Web browser , MOBILE phone) .
- **JsPDF** : an API we used to create PDF file for Analysis report.

- Each member of our group responsible for some pages. Each page contains 3 files (HTML/JS/PHP).

- Totally, we have 9 .HTML, 9 .JS, and 10 .PHP files.

However, there are some more files, those are libraries that we have called.

- We have a coding standard for our team. Every response from server-side must return a JSON format.

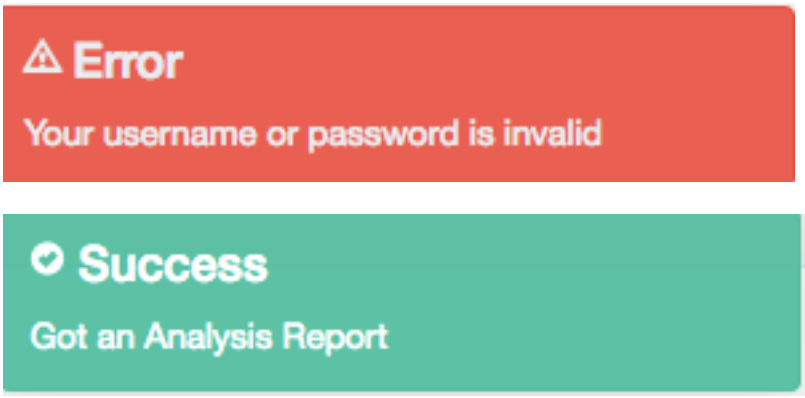
This JSON contains :

Response(boolean) - True / False indicates Successful/Failure.

Message - Tells the error or success message.

Data - Return records from query something.

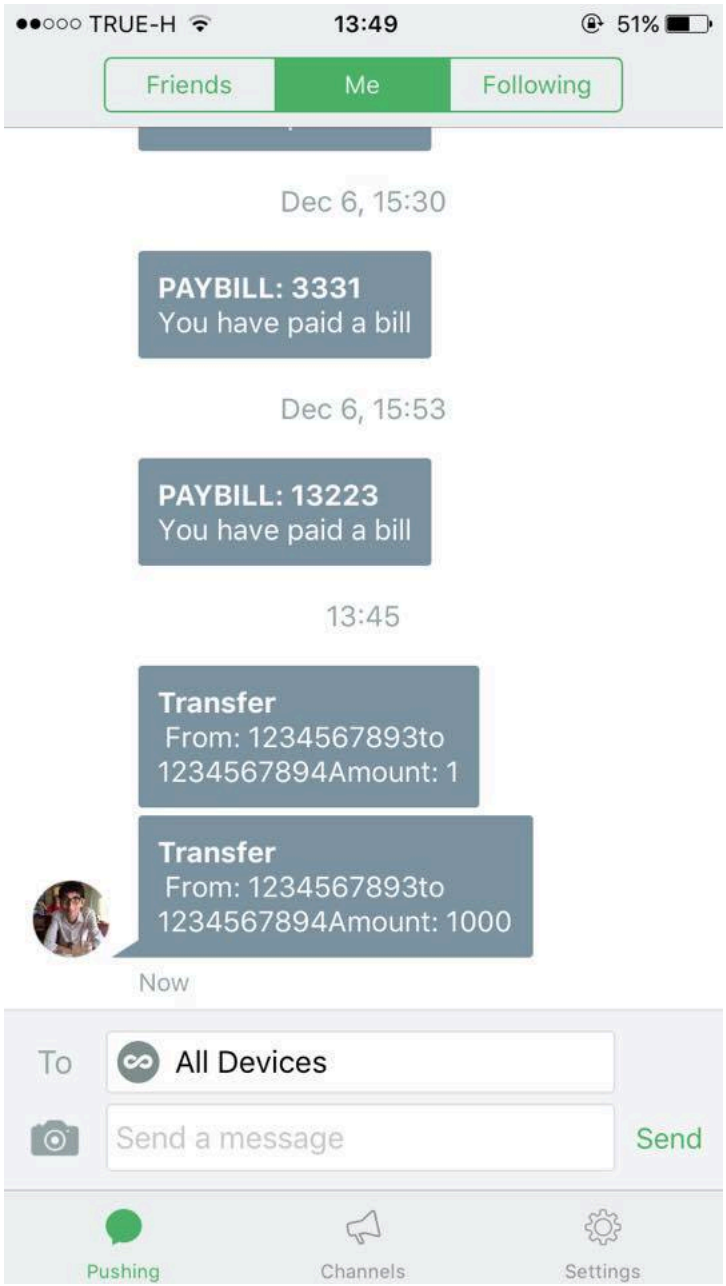
Example of Advantages of our Response format



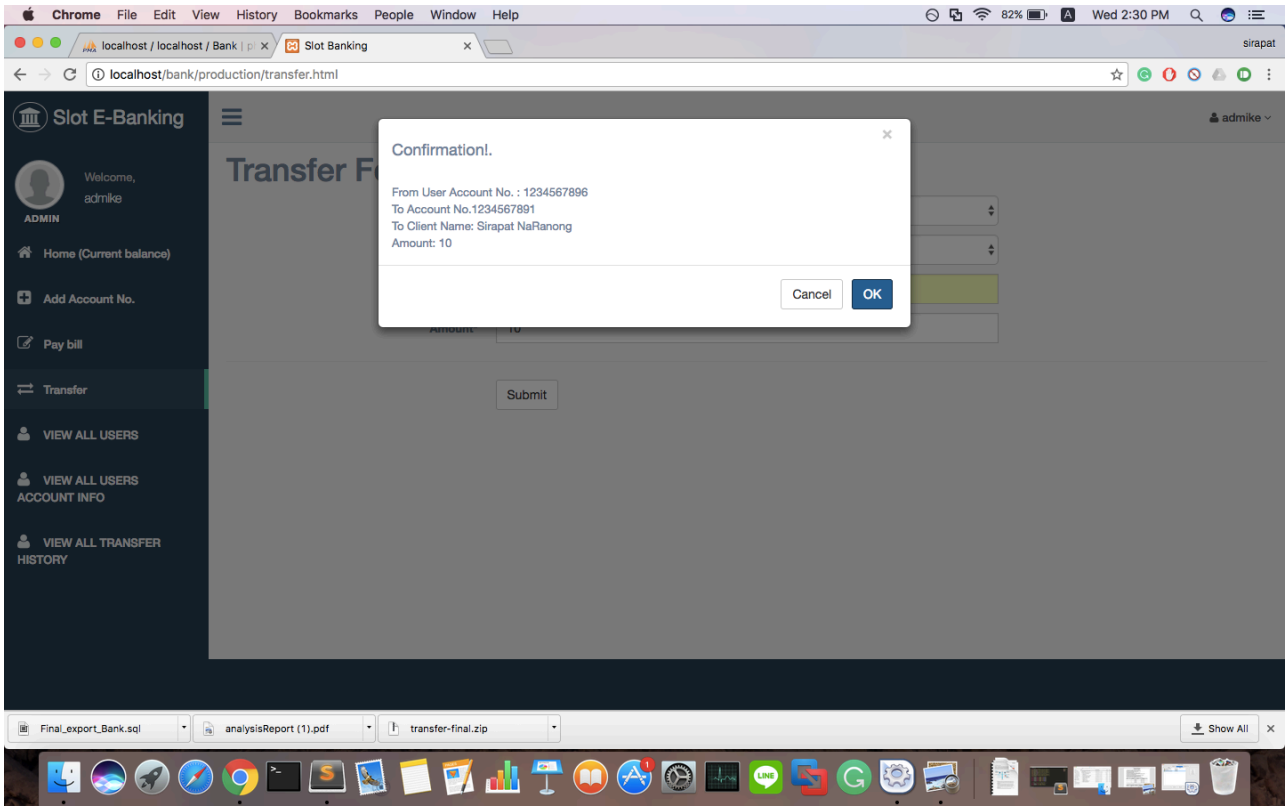
Notification And Alert

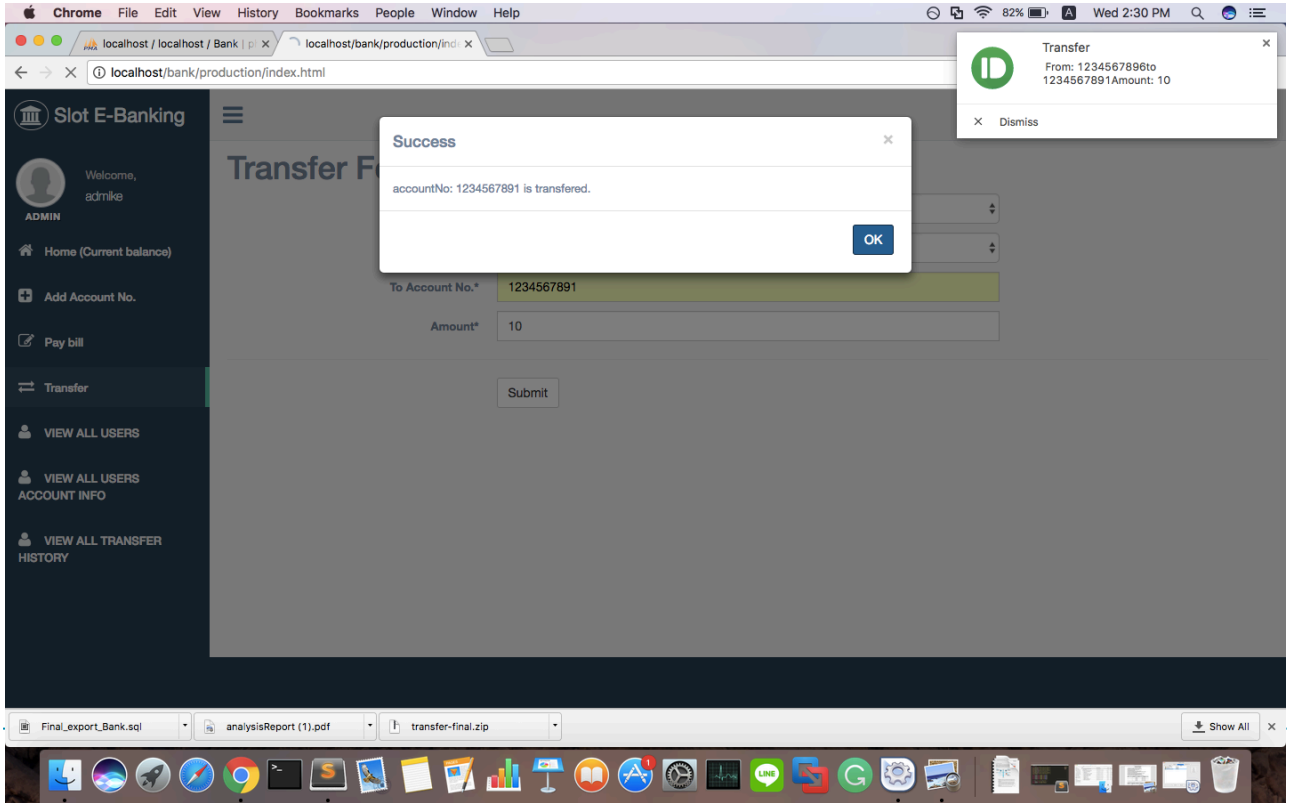
We also implement popup and mobile application for transaction alert and error popup in web-application.

Mobile Alert

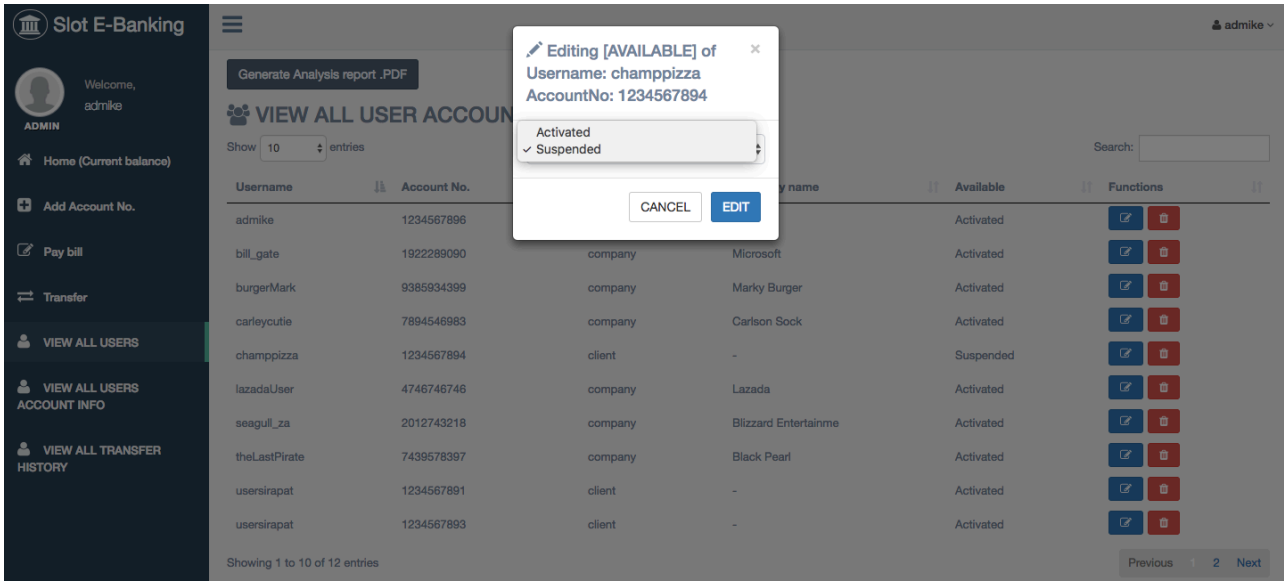


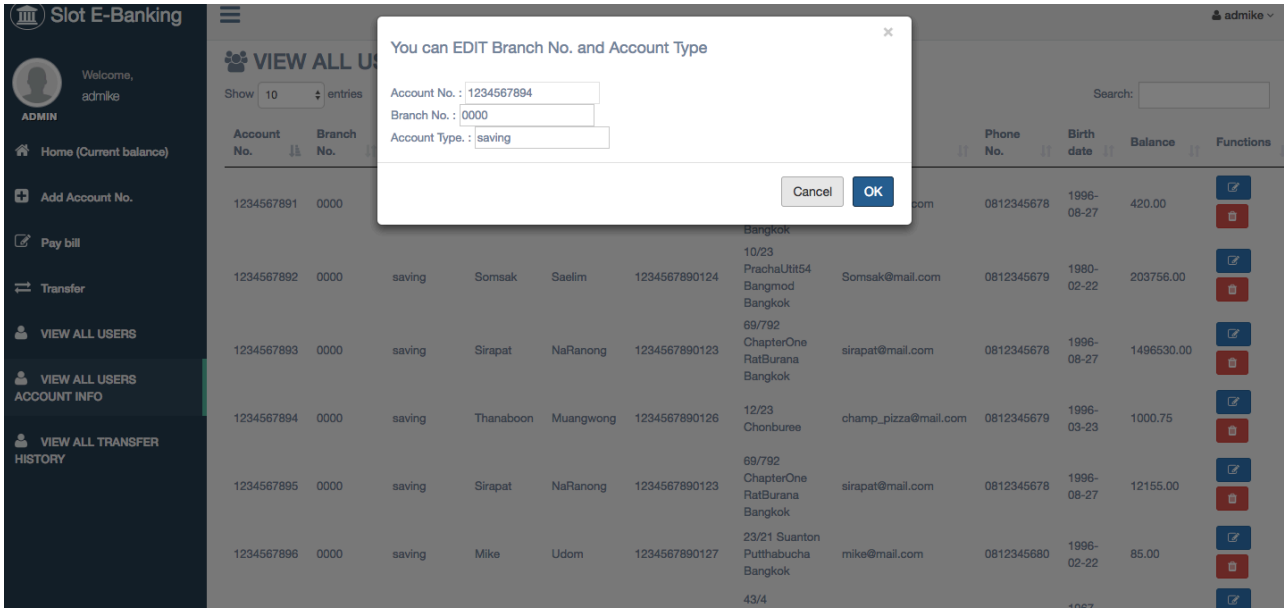
Transaction



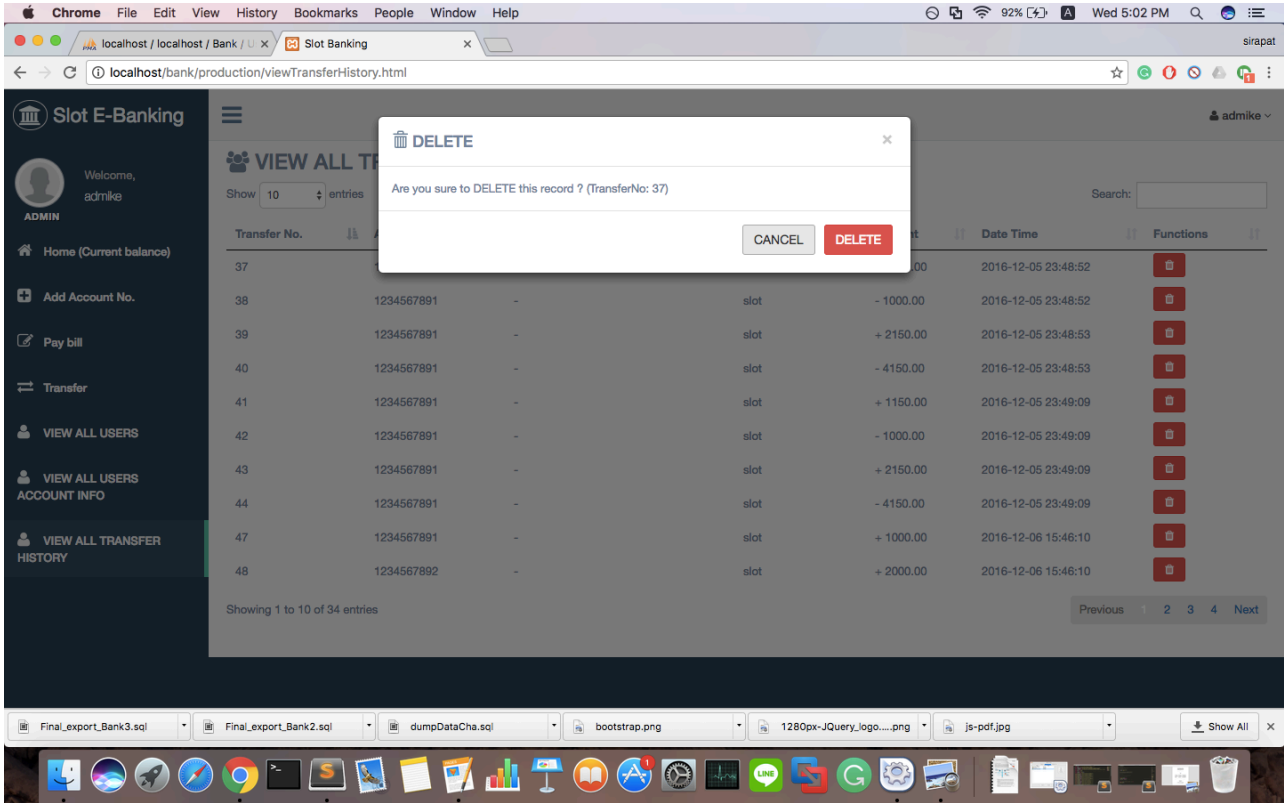


Modified Data

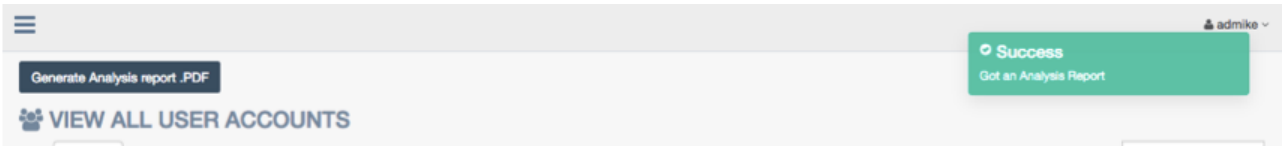




Delete Data



Success Operation



Failure Operation