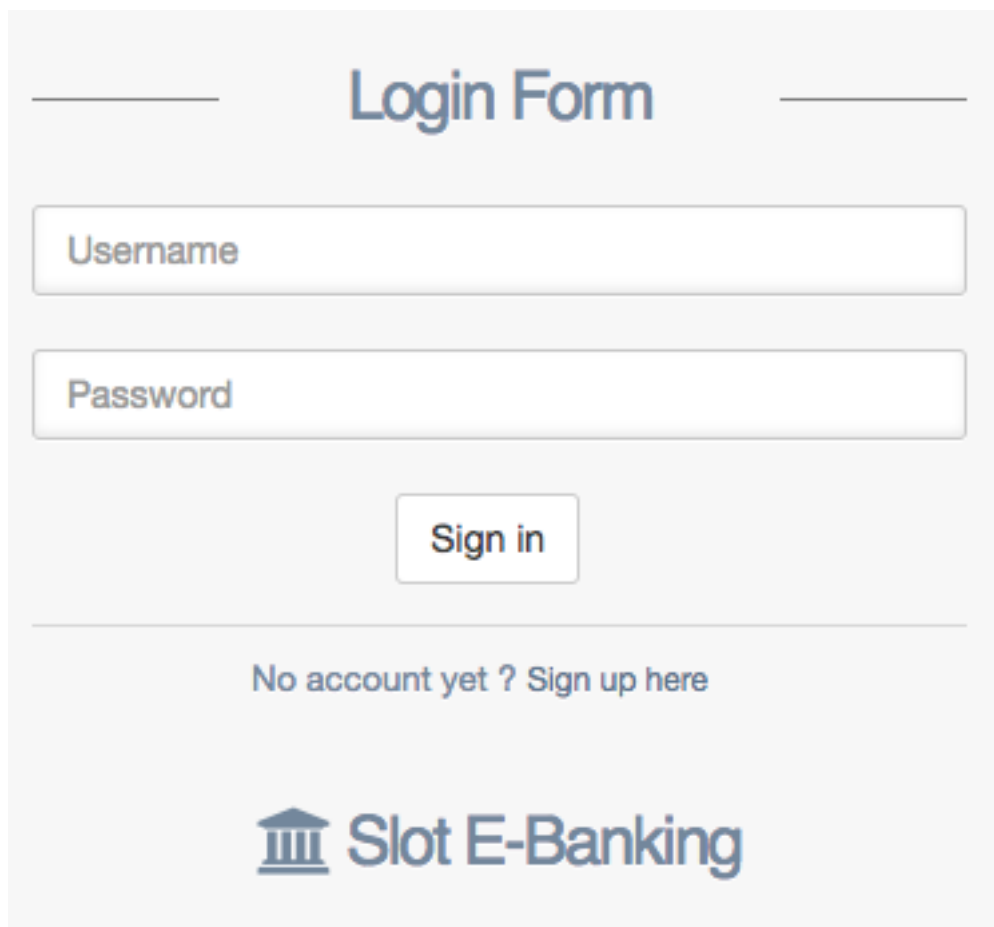

Online Banking System Database Design

A complete Banking System Design

December 7, 2559 BE



The image shows a login form for 'Slot E-Banking'. The form is titled 'Login Form' and contains two input fields: 'Username' and 'Password'. Below these fields is a 'Sign in' button. At the bottom of the form, there is a link that says 'No account yet ? Sign up here'. The logo for 'Slot E-Banking' is displayed at the bottom of the form, featuring a stylized building icon next to the text 'Slot E-Banking'.

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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.

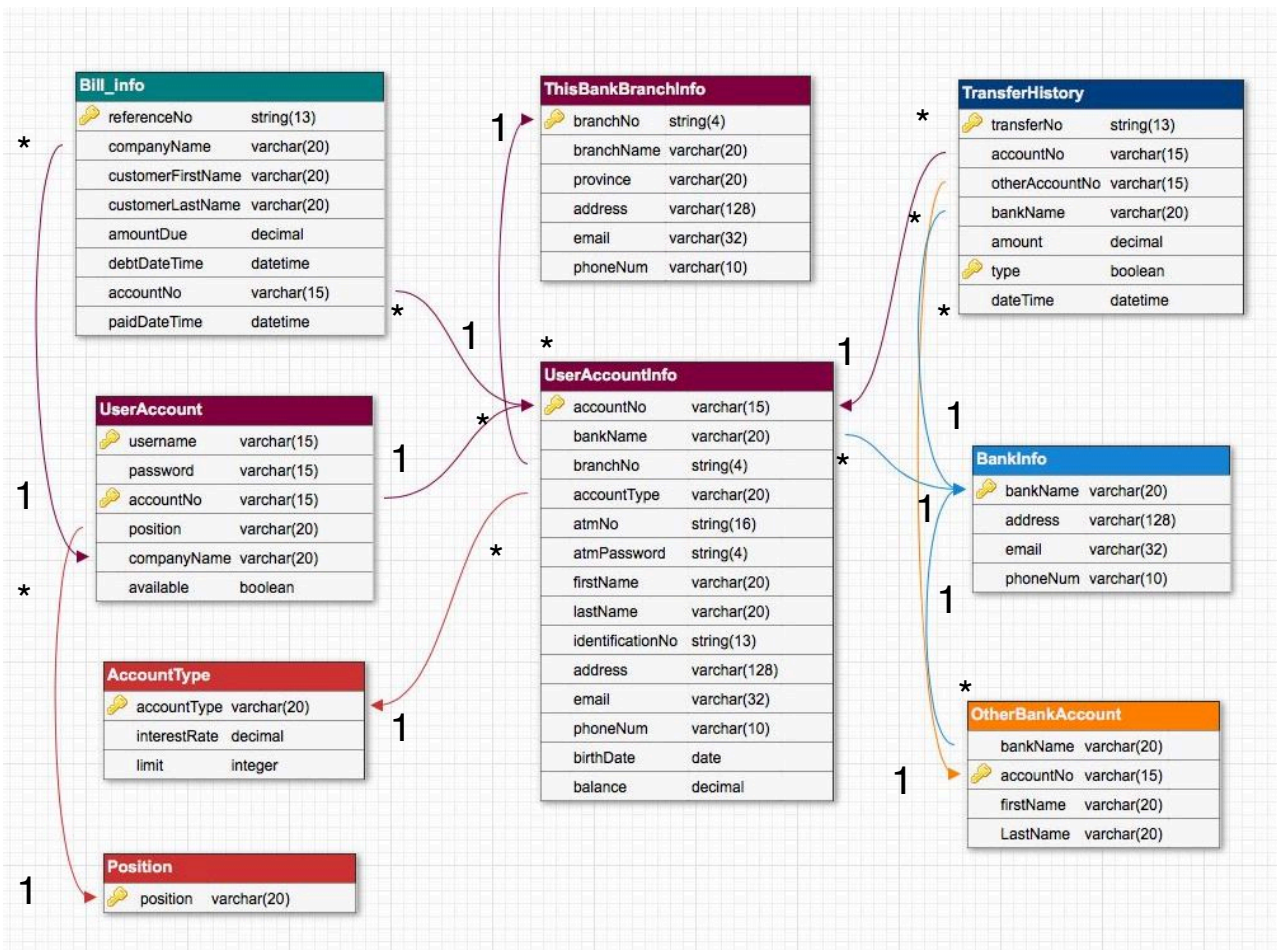
PHP is a server-side scripting language designed primarily for web development but also used as a general-purpose programming language. PHP originally stood for Personal Home Page, but it now stands for the recursive acronym PHP: Hypertext Preprocessor^[1].

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

Slot E-Banking

Welcome, usersirapat

CLIENT

Home (Current balance)

Add Account No.

Pay bill

Transfer

Select an Account ...

1234567891

Current Balance

420.00

Wed Dec 07 2016 16:49:12 GMT+0700 (ICT)

HISTORICAL TRANSACTIONS

Show 10 entries

Search:

Transfer No.	Account No.	Amount	Date-Time
37	1234567891	+ 1150.00	2016-12-05 23:48:52
38	1234567891	- 1000.00	2016-12-05 23:48:52
39	1234567891	+ 2150.00	2016-12-05 23:48:53
40	1234567891	- 4150.00	2016-12-05 23:48:53
41	1234567891	+ 1150.00	2016-12-05 23:49:09
42	1234567891	- 1000.00	2016-12-05 23:49:09
43	1234567891	+ 2150.00	2016-12-05 23:49:09
44	1234567891	- 4150.00	2016-12-05 23:49:09
47	1234567891	+ 1000.00	2016-12-06 15:46:10
53	1234567891	- 7000.00	2016-12-06 15:46:10

Showing 1 to 10 of 15 entries

Previous 1 2 Next

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

Slot E-Banking

Welcome, usersirapat

CLIENT

Home (Current balance)

Add Account No.

Pay bill

Transfer

Add account form add an account

Account No. *

ATM No. (16) *

ATM Password (4) *

First name *

Last name *

Identification No. (13) *

Birth Date * 12/07/2016

Submit



- 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

The screenshot displays the 'Slot E-Banking' interface. On the left is a dark sidebar with a user profile (bill_gate), a 'COMPANY' label, and navigation links: 'Home (Current balance)', 'Add bill' (highlighted), 'Pay bill', and 'Transfer'. The main content area has a header with a menu icon and the user name 'bill_gate'. Below the header is the 'Add Bill form' with five input fields: 'Reference Number *', 'Customer First Name*', 'Customer Last Name*', 'Amount*', and 'Date*' (with a placeholder 'mm/dd/yyyy'). A 'Submit' button is below the form. Underneath is the 'VIEW ALL BILL INFO' section, which includes a 'Show 10 entries' dropdown and a search bar. Below this is a table with the following data:

Reference No.	Company Name	First name	Last name	Amount	Date issue	Paid by	Paid Time	Functions
1009	Microsoft	Sirapat	NaRanong	200.00	2016-11-30 00:00:00	1234567891	2016-12-07 17:15:00	 

- View All Bill Info query from Bill_info. After user submit 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

Welcome, admike

ADMIN

- Home (Current balance)
- Add Account No.
- Pay bill
- Transfer
- VIEW ALL USERS**
- VIEW ALL USERS ACCOUNT INFO
- VIEW ALL TRANSFER HISTORY

Generate Analysis report .PDF

VIEW ALL USER ACCOUNTS

Show 10 entries

Search:

Username	Account No.	Position	Company name	Available	Functions
admike	1234567896	admin	-	Activated	
bill_gate	1922289090	company	Microsoft	Activated	
burgerMark	9385934399	company	Marky Burger	Activated	
carleycutie	7894546983	company	Carlson Sock	Activated	
champpizza	1234567894	client	-	Suspended	
lazadaUser	4746746746	company	Lazada	Activated	
seagull_zs	2012743218	company	Blizzard Entertainme	Activated	
theLastPirate	7439578397	company	Black Pearl	Activated	
usersirapat	1234567891	client	-	Activated	
usersirapat	1234567893	client	-	Activated	

Showing 1 to 10 of 12 entries

Previous 1 2 Next

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

Welcome, admike

ADMIN

- Home (Current balance)
- Add Account No.
- Pay bill
- Transfer
- VIEW ALL USERS
- VIEW ALL USERS ACCOUNT INFO**
- VIEW ALL TRANSFER HISTORY

VIEW ALL USER ACCOUNTS INFO

Show 10 entries

Search:

Account No.	Branch No.	Account Type	First name	Last name	Identification No.	Address	Email	Phone No.	Birth date	Ba
1234567891	0000	saving	Sirapat	NaRanong	1234567890123	69/792 ChapterOne RatBurana Bangkok	sirapat@mail.com	0812345678	1996-08-27	22
1234567892	0000	saving	Somsak	Saelim	1234567890124	10/23 PrachaUtit54 Bangmod Bangkok	Somsak@mail.com	0812345679	1980-02-22	20
1234567893	0000	saving	Sirapat	NaRanong	1234567890123	69/792 ChapterOne RatBurana Bangkok	sirapat@mail.com	0812345678	1996-08-27	14
1234567894	0000	saving	Thanaboon	Muangwong	1234567890126	12/23 Chonburee	champ_pizza@mail.com	0812345679	1996-03-23	10
1234567895	0000	saving	Sirapat	NaRanong	1234567890123	69/792 ChapterOne RatBurana Bangkok	sirapat@mail.com	0812345678	1996-08-27	12

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

Slot E-Banking

Welcome,
admike
ADMIN

- Home (Current balance)
- Add Account No.
- Pay bill
- Transfer
- VIEW ALL USERS
- VIEW ALL USERS ACCOUNT INFO
- VIEW ALL TRANSFER HISTORY

VIEW ALL TRANSFER HISTORY

Show entries

Search:

Transfer No.	Account No.	Other-Bank Account No.	Bank name	Amount	Date Time	Functions
37	1234567891	-	slot	+ 1150.00	2016-12-05 23:48:52	
38	1234567891	-	slot	- 1000.00	2016-12-05 23:48:52	
39	1234567891	-	slot	+ 2150.00	2016-12-05 23:48:53	
40	1234567891	-	slot	- 4150.00	2016-12-05 23:48:53	
41	1234567891	-	slot	+ 1150.00	2016-12-05 23:49:09	
42	1234567891	-	slot	- 1000.00	2016-12-05 23:49:09	
43	1234567891	-	slot	+ 2150.00	2016-12-05 23:49:09	
44	1234567891	-	slot	- 4150.00	2016-12-05 23:49:09	
47	1234567891	-	slot	+ 1000.00	2016-12-06 15:46:10	
48	1234567892	-	slot	+ 2000.00	2016-12-06 15:46:10	

Showing 1 to 10 of 36 entries

Previous
 [1](#)
[2](#)
[3](#)
[4](#)
 Next


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

Complex Form

User Registration


Sign up form

Username

Password 

Account No.

ATM No. (16)

ATM Password (4) 

First name

Last name

☒ Position : Client

☐ Position : Company


Company name (Only for company)

identification No. (13)


mm/dd/yyyy

Sign up

Already has an account ? [Sign in here](#)

 Slot E-Banking

Company Add Bill Information

usersomsak ▾

Add Bill form

Reference Number *

Customer First Name*


Customer Last Name*

Amount*

Date*

mm/dd/yyyy









Submit

 **VIEW ALL BILL INFO**

Show

10 ▾


 entries Search:

Reference No.	Company Name	First name	Last name	Amount	Date issue	Paid by	Paid Time	Functions
1150	TRUE	Sirapat	NaRanong	1150.00	2016-12-06 00:00:00	1234567893	2016-12-06 14:27:26	 
13223	TRUE	Sirapat	NaRanong	2400.00	2016-11-30 00:00:00	1234567893	2016-12-06 15:53:44	 
TRUE1276	TRUE	Sirapat	NaRanong	100.00	2016-11-29 00:00:00	-	Not paid yet	 
TRUE1277	TRUE	Sirapat	NaRanong	200.00	2016-12-01 00:00:00	1234567895	2016-12-07 14:36:25	 

Showing 1 to 4 of 4 entries

Previous 1 Next

Client Transfer Form



Transfer Form

User Account*

1234567892 ▾

Bank Lists*

slot ▾

To Account No.*


To AccountNo

Amount*

Amount

Submit

Pay bill Form



Pay Bill form

Select an Reference Number	-
Current Reference Amount	
Select account*	1234567892
Account Avaliable balance	203756.00

Submit

Analysis Report





















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

Generate Analysis report .PDF

VIEW ALL USER ACCOUNTS

Show 10 entries

Search:

Username	Account No.	Position	Company name	Available	Functions
admike	1234567896	admin	-	Activated	 
bill_gate	1922289090	company	Microsoft	Activated	 
burgerMark	9385934399	company	Marky Burger	Activated	 
carleycutie	7894546983	company	Carlson Sock	Activated	 
champpizza	1234567894	client	-	Suspended	 
lazadaUser	4746746746	company	Lazada	Activated	 
seagull_zz	2012743218	company	Blizzard Entertainme	Activated	 
theLastPirate	7439578397	company	Black Pearl	Activated	 
usersirapat	1234567891	client	-	Activated	 
usersirapat	1234567893	client	-	Activated	 

Showing 1 to 10 of 12 entries

Previous 1 2 Next

Success
Got an Analysis Report

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

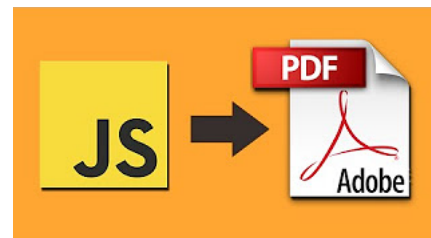
Web Implementation

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.

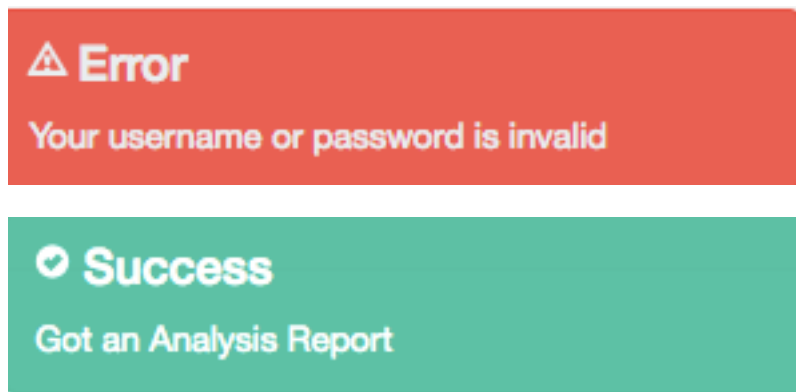
This JSON contains :

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

Message - Tells the error or success message.

Data - Return records from query something.

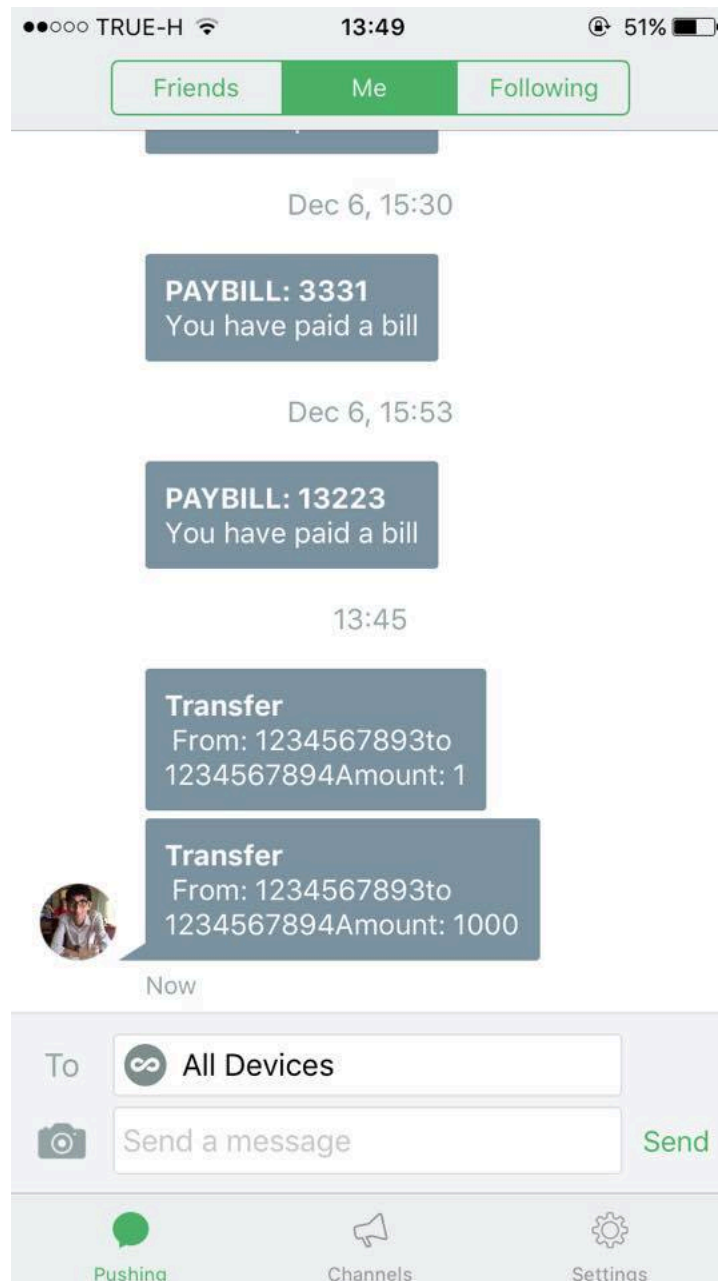
Example of Advantages of our Response format



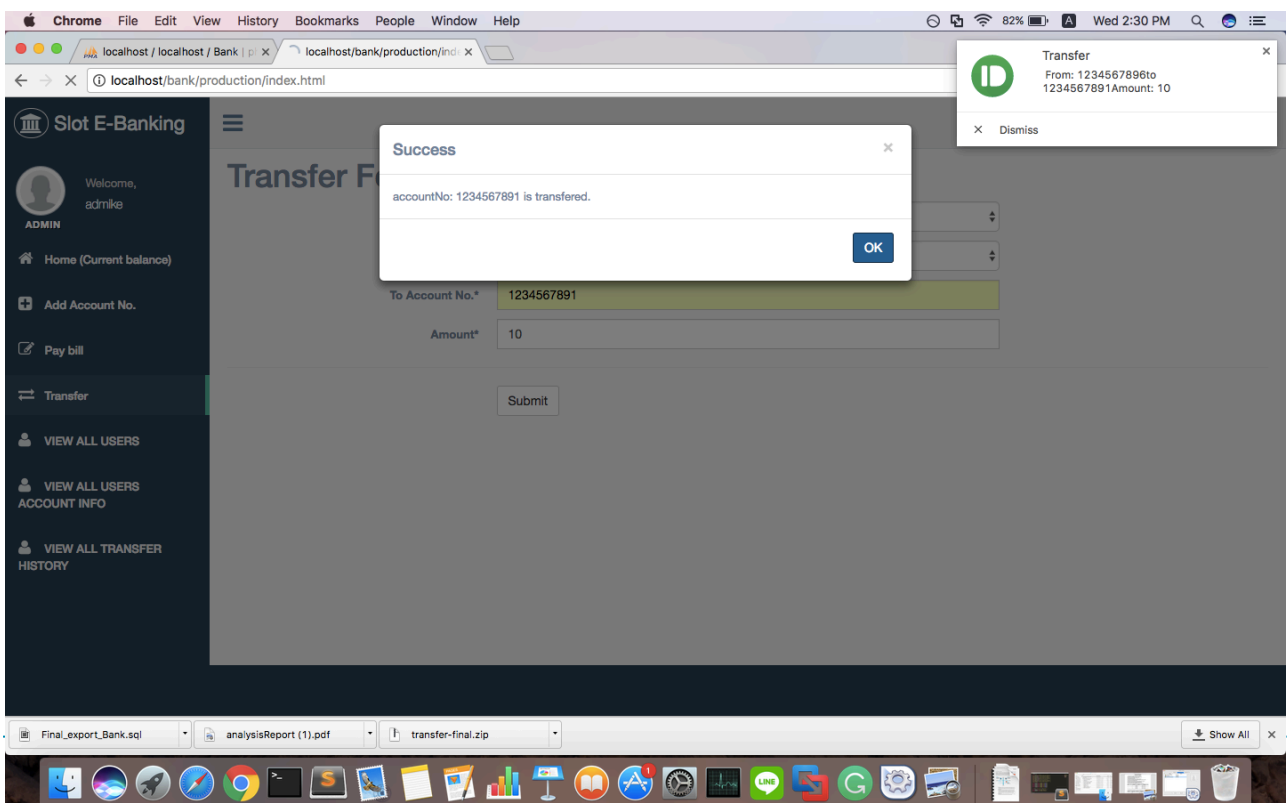
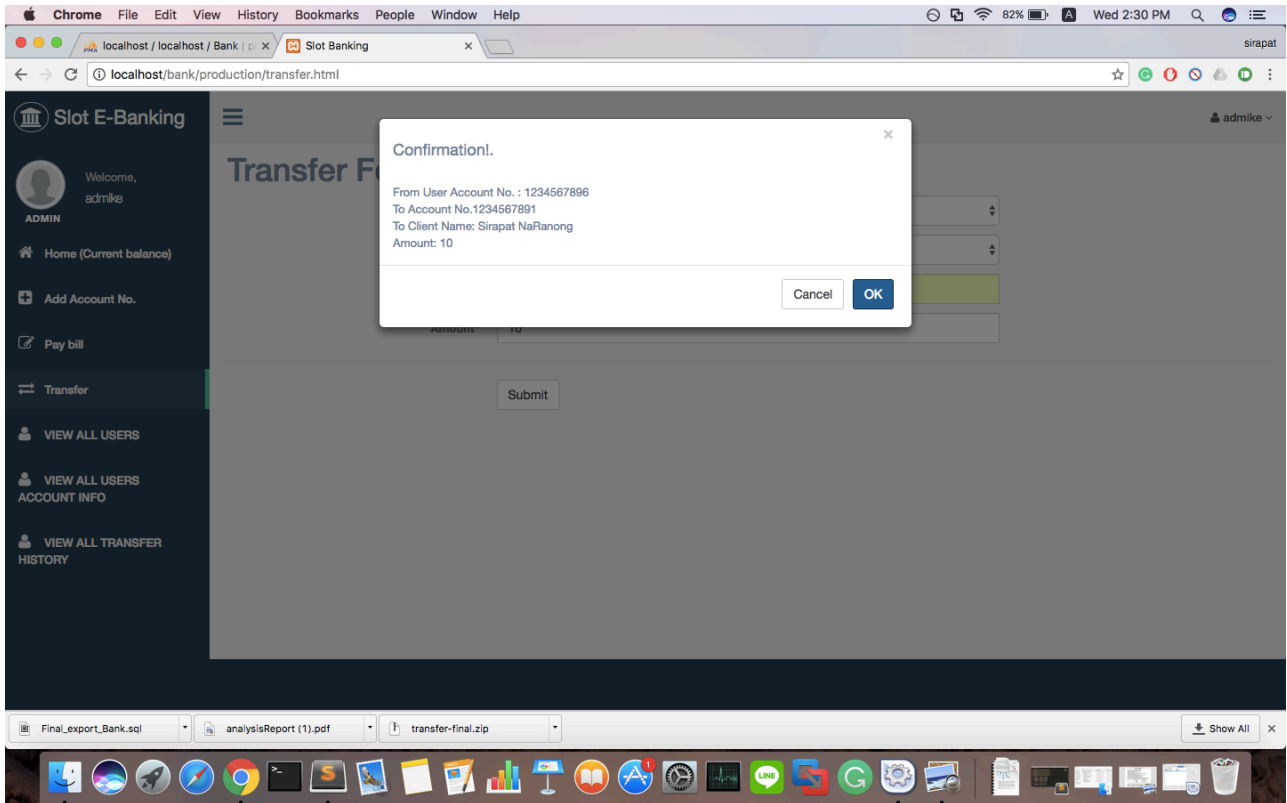
Notification And Alert

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

Mobile Alert



Transaction



Modified Data

Slot E-Banking

Welcome, admike

ADMIN

Home (Current balance)

Add Account No.

Pay bill

Transfer

VIEW ALL USERS

VIEW ALL USERS ACCOUNT INFO

VIEW ALL TRANSFER HISTORY

Generate Analysis report .PDF

VIEW ALL USER ACCOUNT

Show 10 entries

Username	Account No.	Company Name	Available	Functions
admike	1234567896		Activated	<div></div>
bill_gate	1922289090	company Microsoft	Activated	<div></div>
burgerMark	9385934399	company Marky Burger	Activated	<div></div>
carleycutie	7894546983	company Carlson Sock	Activated	<div></div>
champpizza	1234567894	client -	Suspended	<div></div>
lazadaUser	4746746746	company Lazada	Activated	<div></div>
seagull_zz	2012743218	company Blizzard Entertainme	Activated	<div></div>
theLastPirate	7439578397	company Black Pearl	Activated	<div></div>
usersirapat	1234567891	client -	Activated	<div></div>
usersirapat	1234567893	client -	Activated	<div></div>

Showing 1 to 10 of 12 entries

admike

Editing [AVAILABLE] of Username: champpizza AccountNo: 1234567894

Activated
Suspended

CANCEL EDIT

Search:

Previous 1 2 Next

Slot E-Banking

Welcome, admike

ADMIN

Home (Current balance)

Add Account No.

Pay bill

Transfer

VIEW ALL USERS

VIEW ALL USERS ACCOUNT INFO

VIEW ALL TRANSFER HISTORY

VIEW ALL USER ACCOUNT

Show 10 entries

Account No.	Branch No.	Account Type	Phone No.	Birth date	Balance	Functions
1234567891	0000					<div></div>
1234567892	0000	saving	Somsak Saelim	1234567890124		<div></div>
1234567893	0000	saving	Sirapat NaRanong	1234567890123		<div></div>
1234567894	0000	saving	Thanaboon Muangwong	1234567890126		<div></div>
1234567895	0000	saving	Sirapat NaRanong	1234567890123		<div></div>
1234567896	0000	saving	Mike Udom	1234567890127		<div></div>

43/4

admike

You can EDIT Branch No. and Account Type

Account No. : 1234567894

Branch No. : 0000

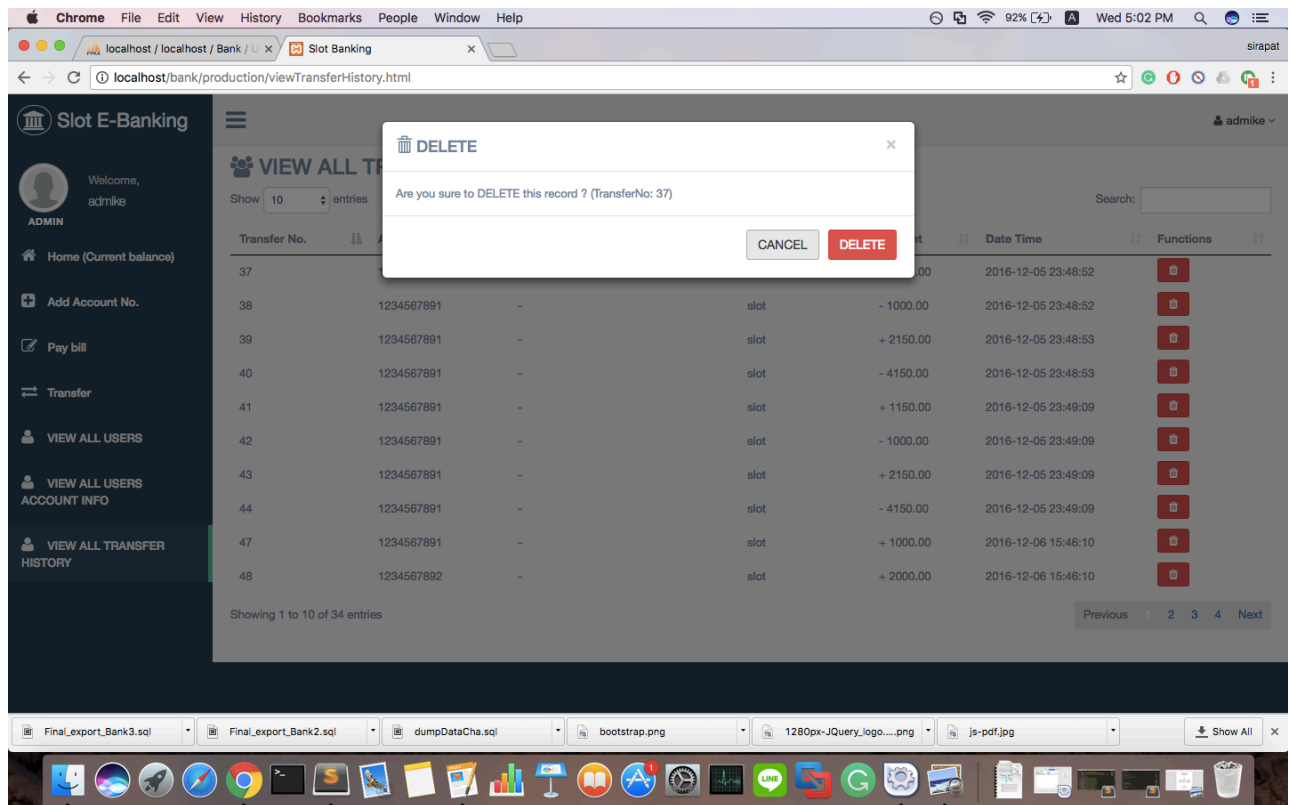
Account Type : saving

Cancel OK

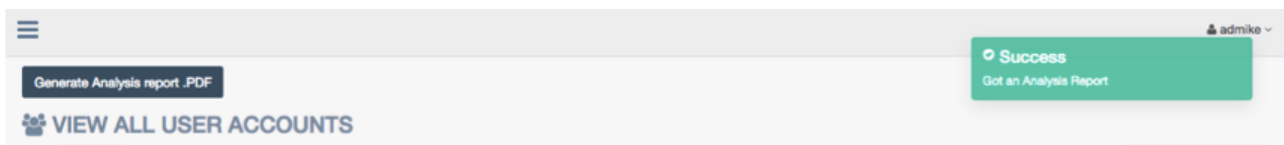
Search:

Previous 1 2 Next

Delete Data



Success Operation



Failure Operation

